OUTLINE OF
PREVENTIVE MEDICINE

FOR MEDICAL PRACTITIONERS AND STUDENTS

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FOR MEDICAL PRACTITIONERS AND STUDENTS

Prepared Under the Auspices of
The Committee on Public Health Relations
New York Academy of Medicine

21 CONTRIBUTORS

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PAUL B · HOEBER · INC
NEW YORK · MCMXXIX

BOSTON MEDICAL
FEB 25 1930
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Published August, 1929

25698 Fi. 400

32. B. 895.

Printed in the United States of America

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FOREWORD

THE usual attitude of the general practitioner toward preventive medicine is of course commendatory but not exactly enthusiastic. The doctor is willing to help and does give important and essential aid, but actual initiative and progressive suggestions come from those whose general environment or particular temperamental interest furnishes a stimulus. The methods and results of preventing disease are largely educative, belonging to the family and school authorities as much as to the doctor. These methods, not being objective, do not arouse in the physician the same personal interest that he feels for the operative, dietetic, and medicative procedures.

The subject of preventive medicine in all its relations is, however, most fundamental in importance to the medical profession. The plan to present it definitely and comprehensively involves a publication never heretofore issued and greatly to be desired. Prevention of disease means not only an educational process involving considerations of surgical interference, inoculative serum-giving, dietetic, climatic, and even clothing habits of life, but likewise a general presentation of all the forms of medical art.

Prevention of disease involves at least two lines of action, one preventing the contraction of certain diseases, the other preventing the development of serious symptoms of the disease contracted. A man may have syphilis or tuberculosis or malaria and may with care be kept free from the dangerous or more serious results. One can live a long and comparatively comfortable life even though a luetic or tuberculous infection be present. Thus "prevention of disease" often means the prevention of the disturbing symptomatic effects of a fundamental specific disease invasion.

Public health and disease prevention presumably have some effect on the decrease in the mortality rate and this latter is measurably an index of the degree to which disease is prevented. Emphasis on this point of view is usually stressed by insurance people but we must also remember that many distressing and disabling diseases do not necessarily shorten life. It often happens, for example, that dementia praecox patients live longer than the average normal person; likewise many nervous and skin diseases do not shorten life. The ordinary man of today reaches the age of fifty-eight years instead of the twenty-eight years which was his average span several hundred years ago. He now lives a happier, merrier life, no doubt, but he also must suffer from more diseases than did his short-lived ancestor. The art of preventing disease, therefore, grows in importance and extent along with the fact of increased longevity.

There are disease conditions which make life's prolongation painful if not useless and undesirable. As citizens and community lovers we must feel in sympathy with Quintus Horatius Flaccus when he says:

> Tempus abire tibi est ne potum largius aequo
> Redeat et pulset lasciva decentius aetus.

(You have played, you have eaten, and you have drunk your fill: if you cannot live helpfully and decorously, it is time for you to walk off the stage.)

The art of preventing disease and rendering it less disabling and painful should be continuously and intelligently cultivated until there are none who must "walk off the stage" because they cannot live decorously and comfortably.

CHARLES L. DANA.

NEW YORK
May, 1929.

INTRODUCTION

Prevention of disease has had the increasing interest of the practitioner of medicine and particularly so during the last decade. The advocacy of periodic health examinations is the outcome of this interest.

Preventive medicine covers the consideration of several distinct but correlated tasks, notably the recognition of tendencies or preclinical signs indicating the development of pathological processes, the early recognition of existing disease to prevent its progress so far as may be possible, and the prevention of complications in the presence of disease.

To say that health is the greatest asset of any nation, community, or individual is axiomatic. In this age of maximum efficiency in industry and advancement of civilization, there has come an insistent public demand for better health.

Public health agencies have been created by the nation, state, and community; voluntary health work has arisen as the result of generous philanthropy, and large insurance companies have gone into the field to reduce sickness and lengthen the span of life by preventive measures.

Medical pedagogy from its dawn until recently has devoted its efforts chiefly to the recognition of disease, its cause, nature, and cure or palliation, with insufficient emphasis on prophylaxis and what are now termed preclinical signs of disease. Under the stress of active care of the sick, physicians have been prone to consider the potential but slight and scarcely inconvenient signs of disease as trivial and of no moment. The advances in the recognition of these preclinical signs have resulted largely from self-education and keen interest. Some physicians have given the matter more attention than have others.

The Third Report of the Commission on Medical Education (1928) confirms these conclusions in the following words:

Even at present, and increasingly in the future, the employment of preventive measures must be chiefly the responsibility of individual practitioners of medicine, in part working in cooperation with health authorities, in larger part on their own initiative. If practitioners are not trained properly in this field a great portion of their value will be lost. It can scarcely be questioned that, in most if not all medical schools in this country or elsewhere, the general impression made upon the student does not bring this out clearly, nor is the physician as a rule adequately trained to meet responsibilities of this sort in actual practice. His training, like the interest of most of his teachers, is chiefly in the study of the phenomena of disease and in curative treatment. Very commonly preventive measures are still pictured by many teachers as of collateral interest only and in large part matters for health officers to deal with.

The relative tardiness of the medical profession in recognizing the value of the periodic health examination has resulted in the creation of corporations undertaking this work on a commercial scale; the establishment of diagnostic clinics and the like. Extreme specialization in the medical profession is perhaps another reason why physicians have hesitated to undertake, single handed, the rather comprehensive task of a complete and efficient health examination. There is no need to indicate the advantages of specialism, particularly where complex advances constantly result from fruitful research, or where unusually expert technique can be acquired only by a large amount of specialized work. As the specialist cannot, however, completely serve his patient without the knowledge of preclinical signs of disease, this alone is sufficient to demand that his special training must rest on a foundation of broad general medical knowledge.

Keeping people well is fundamentally the task of the general practitioner. He is better able to do this than are groups of specialists associated for the purpose, as there are

other things that influence well-being and health, in addition to the physical condition of the body, of which he is more apt to be aware. The general practitioner should school himself in this relatively modern task and naturally avail himself of any indicated aid by specialists in health as he does in disease.

Repeated requests for an outline of the practical features in the prevention of disease induced the Public Health Relations Committee of the New York Academy of Medicine to appoint a sub-committee for the purpose of assembling and supervising the publication of a brief manual of the subject. Each contributor to this volume has written of the ways in which his specialty is related to preventive medicine, limiting his contribution to salient suggestions based on individual experience, with no attempt at textbook completeness. It is hoped that in this way the publication will best serve the purpose for which it was intended.

Frederic E. Sondern
Charles Gordon Heyd
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PREVENTIVE MEDICINE

CHAPTER I

THE PERIODIC HEALTH EXAMINATION

HARLOW BROOKS, M.D.

THE most important factor in medical practice is early diagnosis. In the acute diseases, early diagnosis means the ability to apply adequate and proper therapeutic procedures at the onset of the disease. In the larger realm of chronic diseases early diagnosis is equally important, for in practically every case early recognition of chronic disease affords the possibility of control or cure, or of mitigation in every instance. No more important service can be rendered the community and the individual patient by the physician than the detection of early signs of physical deterioration.

The growing custom of periodic health examinations of supposedly healthy individuals has placed in the hands of the doctor and the community an ideal opportunity for securing early diagnosis.

Oliver Wendell Holmes many years ago quaintly emphasized the importance of the proper selection of ancestors; and paradoxical as it may seem, the prompt recognition of of even congenital defects makes it possible in very many instances to render the lives of many crippled persons efficient, for once the defect, irreparable as it may sometimes be, is recognized, the occupations, the habits of life, and the pleasures of such persons may be so adapted that happy and useful lives are made possible to those who might otherwise become charges on the public, or upon their immediate relatives.

A few physicians assert that they are not interested in this phase of medical work because of the lack of scientific and humanitarian interest. This can never be the experience of one who has thoughtfully tried out the subject. There is no phase of diagnosis which requires a more highly refined skill than the discovery of early and often minute defects which may eventually lead to changes of the gravest and most serious character. The work is fascinating to anyone interested in either the scientific or the humanitarian phase of medicine; and while it is possible, in most instances at least, for any sensible and well-equipped physician to make a satisfactory examination, refinements of technic, judgment, and deep scientific interest can be realized no more completely than in this medical procedure.

No expert in physical diagnosis can preserve his highest nicety of accuracy and judgment without constant reconsideration and practice on the normal, and no other schooling will produce the same power of interpretation of physical findings. Doubtless the work will be of the greatest value when carried out by the general practitioner, though every specialist will find in these examinations abundant opportunity and interest for his own particular line of work, no matter how finely specialized it may be. A recurrence on his part to a consideration of the broad and less refined general physical findings will immediately renew his interest in general disease processes and render him at all times a more skilful and a safer specialist. There is no more broadening and sobering training than this, inasmuch as it recalls the basic principles of his medical education, which is fundamental to his whole edifice of specialization.

From every standpoint, the periodic health examination is valuable and interesting to the examiner as well as to the subject examined, though the preponderance of interest lies naturally with the latter.

One of the really objectionable features of these examinations is recording results. Positive findings are interesting, but cataloguing the commonplace data of the normal is an onerous routine. Some of this may be obviated through the assistance of a clerk, typist, or stenographer. It is absolutely essential that complete reports be made in order that these details may be more fully studied, interpreted, and evaluated in the light of the completed examination. Some set form or blank is also necessary, which later will permit of comparison as well as allow the recognition of the onset of the abnormal condition found in subsequent examinations.

A question frequently asked is, when the periodic examination should begin. Obviously, at birth. If the full value of the method is to be realized, it should begin with the record of the initial status of the new born. Perhaps only the pediatrician realizes to the full the value of this record, but it is most apparent that one should begin at the beginning. When should the examinations cease? Obviously, not until the cessation of life; that is, the periodic examinations should continue throughout life, and in no period do they cease to be of value both to the patient and to the examiner.

There is still another benefit to the patient and to the physician which is a direct outcome of this procedure. There is probably no one thing which will be more likely than the periodic health examination to reestablish the delightful relationship which has existed in the past between the family and the practitioner, and which today is regrettably disappearing. It obligatorily brings together the physician and his tentative patient. In time of the calamity of disease, what can be more logical and sensible on the part of the sick person than to consider first and desire the opinion of that person whom he knows to be most familiar with his personality and status in health. That such a dependence

would be of inestimable value both to the patient and to the physician is most obvious.

Particularly because of this fact, it is far more desirable that these examinations be conducted by the physician standing in the intimate relationship of family counselor, rather than by an outside organization of an entirely impersonal character. In case conditions are found requiring the opinion or assistance of a specialist, the family physician is the person most competent to advise as to time and person.

The suggestion that such examinations be conducted by outside agencies, by dispensaries or insurance organizations, appears disadvantageous from every viewpoint. The work should never be conducted from an entirely scientific, commercial, or impersonal standpoint, but from that of an adviser conversant with the social status, psychology, and requirements in general of the subject. The family practitioner is the logical person to be responsible for this important matter and if his medical education does not fit him for this work, corrections should be made accordingly in the medical school curricula. As a matter of fact, there is no graduate, young or old, who should not be able to conduct such an examination satisfactorily, unless specialization has obliterated the results of his primary instruction in physical diagnosis, anatomy, and physiology.

Some regular system in the examination should be preserved. Blanks already exist such as that used for recording the examination of recruits for the Army. The blank suggested by the Committee of the American Medical Association is also satisfactory and entails little unnecessary clerical work. (See page 14.) Most physicians will eventually devise a blank which they find suitable for their own requirements. It is important that a not too elaborate record card be selected in the beginning and that it be capable of filing, and likewise important that it be of easy access.

The physician should be adequately compensated for this service; a satisfactory examination cannot be made in the time which is commonly devoted to an office call and the patient should be given to understand that this examination is more than an ordinary call, that it is a very important service, and that it must be compensated accordingly. The fee charged should never be less, and should commonly be more, than that customarily paid for a high class insurance examination. In all instances, a chemical examination of the urine should at least be made. This and all other laboratory procedures should not be performed casually or perfunctorily, but should be seriously done and adequately paid for.

Except in special cases, patients applying for the periodic health examination should be requested to come to the office, where better facilities are almost certain to exist for a satisfactory examination. The weight must be taken and recorded, particularly in the case of growing children, and the height must be measured. Blood pressure must be ascertained. Many other procedures are necessary, which can be more accurately carried out in a properly equipped office than in the patient's home.

In the course of the examination the physician must never content himself with a mere inspection of the major internal viscera. In these examinations the bony framework, lymph nodes, faults of posture and functions, atrophies of muscle groups, and particularly an examination of the skin must be very carefully made. The movement and functions of the entire body are of great importance and unless the outer aspects of the body are particularly noted, many of the most important diseases are likely to escape observation.

All this entails a proper exposure of the body, literally from top to toe. With men and children, no possible question as to the necessity for such complete inspection need be urged. It is as apparent to the subject as to the examiner. With

women a certain consideration for natural delicacy is necessary, but a perfectly satisfactory examination can be easily secured by exposing only portions of the body at a time, and the simple manipulation of a sheet will suffice in all instances. It is mostly the intelligent women who apply for these examinations; the higher the type of woman, the less is she likely to misinterpret the absolutely necessary inspection of the body.

With certain exceptions these examinations should be repeated at definitely stated intervals. During infancy and early childhood, they should be made at not less frequent than semiannual periods, but in adolescent and adult life, once yearly should suffice unless certain conditions demanding special observation have appeared in the meantime. Thoroughness of observation is not necessarily associated with time expended, but it is rather a measure of the physician's interest, power of decision, and ability for observation. The examination should be concluded by a summary which should be given the patient, either in writing or by word of mouth, in which he or his responsible mentors should be given such advise as his condition warrants. Every physician will, however, undoubtedly wish to enter certain private notations on his retained record, which will often contain or include certain possibilities or fears which it may not, at the time, be wise to communicate to the patient himself, although relatives may perhaps be given some indication of them.

In the case of adults, the first record of the examination should always be preceded by a brief history of the patient, his ancestry, his occupation, his education, and of his social as well as his medical experiences. The high value of such an existent record to any patient and its intense interest to the physician or scientist would seem to be obvious. The maintenance of such a really scientific record will further

cement the relationship which should exist between the patient and the family practitioner and will unquestionably rekindle the bond which has become attenuated of late years to a lamentable degree.

A regular system of examination should be followed for the reason that when such a system is preserved, important matters are unlikely to be overlooked. Some physicians may choose to record no normal findings, but they are the exceptions. Signs, musical or mathematical, may be adopted to save time when so desired; thus, R.K.J. >L. is readily understood to indicate that the right knee jerk is greater than the left. Any or all of the usual abbreviations in vogue may be used. The examination may begin with a notation as to posture, to gait, and to deformities of the extremities, if they exist. Next in order would be the examination of the skin, important inasmuch as it portrays most vividly many serious internal disorders and infectional or physiological states. The examination of the scalp should be included here. The physician will note the presence of an adenopathy, either generalized or localized, the presence of external tumors, or atrophied or hypertrophied muscles, and the like. At the same time evidences of old injuries, of trauma of all sorts, fractures, arthritides, dislocations, and disabling scars will be noted.

The examination of the face and head will then be considered. Faults of innervation, ocular defects, paralyses, atrophies, and deformities congenital or acquired, will be recorded. Lesions of the tongue, including its faults of innervation and motility; of the ear—discharging otitis media is very evident. Special data may be required, however, in many instances. In the examination of the neck, the condition of the thyroid gland should receive special attention, consideration being given to the various hereditary, environmental, and physiological states of the body which may cause disturbances in the gland function, not overlooking the fact

that, in the adolescent, the appearance of disease manifestations may be due to the response to emotional and physiological demands.

In the examination of the thorax, too little attention is paid at times to the general form and to the movements of the chest in respiration and exercise. Deformities of the spinal column, asymmetries and the like must be accounted for in the history of the patient, or the anatomical origin for it sought. The breast in the male, and particularly in the female, must receive more than casual attention. It should be remembered in this relationship that the physiological history must always be considered. Palpation may show something in these tissues that inspection fails to discover, and vice versa. The type of chest and general body conformation should also be considered; sometimes it is indicative of some such important disease process as acromegaly.

The significance of a most careful examination of the lungs is today fully realized, as well as the necessity of interpreting the findings in the light of the personal history of the patient and his ancestors. While tuberculosis is undoubtedly the first explanation one should consider with any chronic or slowly developing pulmonary or pleural affection, one must remember that pleurisy frequently develops in the rheumatic conditions, that a pulmonary fibrosis following pneumonia is not uncommon, and that the signs of a recent bronchitis or influenza may often simulate those of tuberculosis. While, of course, in all questionable cases one should consider the assistance rendered in diagnosis by the laboratory, by the fluoroscope and the roentgen-ray plate, it should not be forgotten that these methods give quite as fallible data, even in the hands of the most expert, as do physical signs in the hands of one equally expert in that particular. It is no disgrace, but a sign of good judgment, to request a reexamination, and perhaps several of them, before a positive

opinion is given in lung disease. The apparently increasing prevalence of neoplasms in the lung and pleura, the appearance of spirochetal infections, of leucemias, and the like, as explanatory of lung signs and symptoms must never be forgotten. Where sputum is available, it should always be examined, not only for the tubercle bacillus, but also in regard to its general character.

It has been asserted by highly skilful and experienced physicians that disease of the heart and circulatory organs in general is more accurately discovered by inspection than by auscultation. The position of the apex beat, the character of the pulse, and other important data are apparent on inspection and palpation. Cyanosis and especially dyspnea are the two most infallible and important signs of a circulatory defect not otherwise explained. The effects of exercise on the action of the heart and the production of dyspnea and cyanosis should invariably be recorded. We have long ceased to overvalue the existence of heart murmurs, they are often of little immediate significance and the most important question for determination is always the reaction of the heart muscle, especially when it is put to stress as in the usual exercise tests. A murmur must, however, always receive an explanation. Is it due to an old rheumatism or chorea? Has it recently appeared? Does it disappear under mild exercise, or become accentuated? In the course of what circumstances or what disease process did the murmur probably first become apparent? Is it truly cardiac or extracardiac? Is it due to anemia, to the pressure of enlarged mediastinal nodes? Is it congenital? These are the questions to be answered. Finally and most important, does the heart carry on sufficiently well under the ordinary requirements of this patient's life?

Recently, we have all become much interested in the arrhythmias of the heart. Some of them are highly indicative

of disease, others have little or no pathological significance. It is very important to ascertain if they increase, decrease, or merely disappear under mild exercise. This gives more practical and valuable information than the mysterious record of the electrocardiogram, which is of signal value nevertheless in some conditions, particularly as regards prognosis. The size of the heart is very important. An X-ray examination or a fluoroscope is interesting in every instance, but it is frequently not necessary, for careful direct and auscultatory percussion is immediately accessible to the examiner, and the sensible physician is not likely to be led far astray if he depends on these old, indispensable, and incomparably more valuable methods of examination.

The physician who is particularly interested in cardiovascular or respiratory diseases will wish to exhaust every resource in the study of these two important systems, but in nearly all instances, good judgment and the ordinary methods of examination will entirely suffice, insofar as the best welfare of the patient is concerned. The ambitious physician should not forget the tremendous opportunity which he has for the study of the early and minor disturbances of any system and he will get out of every examination a value to himself proportionate to the effort that he puts into it.

Except in the hands of the most expert, the type of examination of the abdomen will be determined chiefly by the symptoms of probable abdominal origin which the patient gives. An enlarged liver or spleen will be easily detected, except in a person with a very stiff or obese abdominal wall, when the organs may be difficult to outline. Hernia should always be carefully searched for. A small umbilical hernia has been known to produce widespread and grave abdominal symptoms. Of course everyone knows that deformities and lesions of the abdomen may be much more readily detected

with the patient in the standing position than when lying down on the examination table. Tumors of the abdomen must be explained, but it must be recalled that, as Naunyn was fond of impressively saying, the most common tumor of the abdomen is removed by the enema or physic rather than by the surgeon's knife. Much less attention is now being paid to enteroptosis and the mal or loose position of the various abdominal organs, but every experienced physician is well aware that symptoms are produced in some persons by the very lesion which in other persons, of perhaps less emotional sensitiveness, excites none whatever.

A close and detailed examination of the pelvis is demanded in some, but not all, instances. It should always be offered a woman, young or old; whether she chooses to grant or refuse it is a matter for her judgment unless, in the opinion of the physician or because of a history of symptoms not otherwise explained, pelvic disease is suspected; in which case the physician should insist, not on the examination, but on the need of it.

The amount of information which may be furnished by a proper examination of the rectum is sometimes forgotten. It is possible in children and in the most fastidious of women; in the male it often furnishes the only possible avenue for obtaining most necessary information of signal value. A finger cot, a little lubricant, and two minutes will often decide an important question for the patient and examiner. Proctoscopy is commonly of much less value, and it requires a somewhat higher technical skill, but skill not at all beyond the possibilities of the ordinary physician. One of the writer's young colleagues confided in him that he had taken occasion to familiarize himself with the normal in several diagnostic procedures by utilizing as his material those who came to him for a general periodic health examination, a mutually desirable practice for both physician and patient.

Examination of the genitalia is all too infrequently carried out and often too superficially. We all realize the very important rôle which these organs play, not only in physical disease, in the numerous infections which frequently arise in this region, but also in the disturbances of the emotional and nervous systems. They should always be examined in the male and suggested in the female, though this last need not always be insisted upon save where indications of disease in this region are suggested. The intelligent woman, however, generally desires such an examination, and in the later periods of life, when new growths of the sexual organs of a grave type are likely to occur, the examination may be insisted upon with entire propriety.

Throughout the entire examination the physician soon learns to question the patient, not only on matters directly pertaining to his health, but also relative to his occupation, his pleasures, his habits in diet, the use of alcohol, tea, coffee, or tobacco, or other such practices. Without the patient becoming aware of the fact that such a purpose is intended, a very definite opinion can finally be determined as to the mental and emotional reactions and the general behavioristic responses of the patient.

Every physician automatically acquires a considerable knowledge of psychology, physiological and pathological, and a little reading will suffice to qualify him to judge, in no amateurish fashion, as to the usual psychoses. This is considered one of the most important of the data likely to be derived from the periodic health examination. It is largely in the course of such an examination, when the patient is likely to be completely disarmed as to the purpose of the physician, engaged as he in the physical examination, that a real estimate of the former's emotional and mental condition may be correctly determined. The importance of an unbiased and fair record of the patient's condition in these respects

cannot be overestimated, and the general practitioner is more likely to receive this than is the expert, particularly when the patient is cognizant of the latter's particular function.

Opportunity is now offered through these periodic health examinations to apply the information at present made available through the many recently published articles on this subject. In most cases, access is to be had to a better type of human material than is available in hospital and clinics; this is more true of the more highly qualified intellectual group.

Finally, there is probably no other one method of work, recently presented, which offers more to the good physician in the opportunity given him to study and observe, as well as a more legitimate means to augment his income by a most commendable service to both the patient and the public. It bids fair to replace the family physician as the confidential adviser and valued friend in the mind of his patient, if he will but seize and cultivate this opportunity; and it tactically places him once more in the position of family consultant in all phases of medical work.

It is difficult to conceive of a more valuable service that the family physician can render to his patient than the prevention of disease, the prolongation of his life and his efficiency, and the conservation of his happiness and content. For the public, the service can become the most important function of a real Public Health Program, one beneficial in all ways to the community, to the individual, and to the physician himself. The tremendous educational value that may be derived by the studious physician from this practice must again be emphasized. The doctor should not permit this opportunity to pass, nor should he, in the case of the well-to-do, minimize its economic value to his patient.

PERIODIC HEALTH EXAMINATION

PREPARED AND PUBLISHED BY THE
American Medical Association, 535 North Dearborn Street, Chicago, Illinois

Form A — **HISTORY FORM**

Use check mark (✓) in making affirmative answer to questions wherever possible.

1. **Name** — **Country of Birth**
2. **Address** — **White** — **Colored**
3. **Age** — Religion — **Single** — **Married** — **Widowed** — **Divorced**
4. **What is your present occupation**
5. Have you changed your work frequently — Why
6. **What are the conditions of your work**

Regular	Dangerous	Dark	Smelly	Seated	Hours per day
Satisfactory	Fatiguing	Light	Noisy	Standing	Days per week
Monotonous	Indoors Out	Dusty	Crowded	Walking	

7. Are your earnings sufficient to support yourself and dependents comfortably
8. **What are your home conditions**

In a family	Congenial	Quiet	Room and bed to yourself
Alone	Depressing	Irritating	Time to yourself

9. **What are your sleeping conditions**

Hours in bed	Windows open	Restful	Disturbed

10. **How often do you eat**

Regularly	Where	Between meals	Time of meals

11. **Are you a moderate or hearty eater,** taking one or more helpings at a meal of

Meat (including fish and eggs)	Pie, Cake or Pastry	Salads
Baked beans	Sweets or Sugar	Bread
Green vegetables (spinach, cabbage, etc.)	Fruits	Butter
Potatoes (rice, macaroni or cereal)		

12. **How much do you drink daily of**
Milk Tea Soft drinks
Water Coffee Alcoholic drinks

13. How frequently do you use candy How much tobacco

14. **Do you have a movement of the bowels daily** With the use of drugs

15. What exercise do you take in addition to your work

16. What are your social, religious, political, club or trade associations

17. What are your pleasures Recreations Hobbies

18. **Are you subject to worries** **Moods** **Periods of alternating gloom and cheerfulness**

19. **Have you ever been ill with any of the following, or any other severe illness and at what ages**

Tuberculosis	Scarlet Fever	Frequent Colds
Malaria	Diphtheria	Convulsive Seizures
Rheumatism	Typhoid Fever	Nervous Breakdown
Syphilis or Gonorrhea	Tonsillitis (Sore Throat)	Migraine or Neuralgia

19 A. **Do you ever have**

Headaches	Colds	Nausea or vomiting
Loss of appetite	Cramps	Palpitation
Shortness of breath	Swellings	Boils

20. **Have you been protected against smallpox typhoid diphtheria or other diseases by vaccination and when**

21. Have you had any accidents, broken bones or surgical operations

22. How often do you consult your dentist When last

23. **Are your parents, brothers and sisters living**
If not, what were the causes of death and at what ages

24. Have either of your parents or any brother or sister had consumption cancer
Insanity epilepsy gout diabetes

25. **Do you consider yourself in good health** If not, what is your complaint

For Women
26. **Are your monthly periods regular** Prolonged Excessive

27. **Have they interfered with your occupation** In what way

28. **Have pregnancies and confinements been free from accident**

The Editors are indebted to the American Medical Association for the privilege of publishing this form.

Form B PHYSICAL EXAMINATION RECORD

Name | Case No. | Date

1. Height | Weight, Present | Pulse | Bl. Pres. { Sys. / Dias.
Usual | Sitting
Standard | After exercise | Temp.
(for age and height) | 2 minutes later

Hearing R **Vision R** **Corrected R**
L **L** **L**

Urine: appearance | Sp. Gr. | Alb. | Sugar

Feces (when indicated): appearance | Blood | Parasites

Record only abnormal conditions

2. **Standing**
Posture
Musculature
Nutrition
Skin
Superficial Glands
Female Breast
Hands
Arms
Male Genitalia
Hernia
Legs
Feet
Romberg sign

3. **Sitting**
Hair
Eye reflexes
Nose
Teeth

Gums
Tongue
Tonsils
Pharynx
Ears
Chest
Heart
Lungs
Visceral Ptoses

4. **Lying down**
Abdomen
Reflexes
Sensation
Liver
Spleen
Kidneys
Prostate Gland
Female genitalia
Rectum (hemorrhoids)

5. **Summary**: Defects of function and structure and errors of habit.

6. **Advice given to the patient:**

CHAPTER II

THE INCIDENCE OF DISEASE

E. H. LEWINSKI-CORWIN, PH.D.

THERE is hardly a branch of the science of Sociology which is of more practical everyday concern than that which deals with the statistical facts of disease. And yet the quantitative study of the phenomena of disease occurrence has not received the attention it deserves. Aside from the several notifiable diseases, no sustained effort has been made to obtain periodically definite data relative to the incidence of disease. The only exception in this country is the enumeration of cases of disabling illness at the time when the Federal population censuses were taken in 1880 and 1890. All other endeavors to ascertain the distribution of illness were sporadic and concerned themselves with more or less limited population groups at certain points in time. Studies to establish the amount of sickness among the same group of people through a period of time have been few, and among these should be mentioned the one made in New York City by the Committee on Public Health Relations of the New York Academy of Medicine, and a much more elaborate one at Hagerstown, Maryland, carried on for twenty-eight months by the United States Public Health Service.

Consequently our knowledge of morbidity, aside from the epidemiology of the communicable diseases, is inadequate and is based, on the one hand, entirely on the results of fragmentary surveys and the experience of benevolent sickness funds and fraternal organizations, and on the other, on mortality bills. The latter source is by far the more important, hence the great social significance of truthful and scientific reporting of the causes of death by physicians. Unfortunately, not all

medical men as yet realize the full import of accurate recording of the causes of death in accordance with the requirements of the international classification. This classification is being revised decennially, and all local registrars of vital statistics in the United States are requested by the Federal Census office in Washington to follow it in their tabulations of the causes of death.

It is needless to stress the fact that bills of mortality even at best do not adequately reflect the incidence of illness. There are diseases which cause a great deal of disability and which are rarely the direct cause of mortality. Among these might as an example be mentioned malaria, ankylostomiasis, chlorosis, "biliousness," colitis, "rheumatism," dysmenorrhea, common colds, rachitis, dental caries, varicose veins, and numerous other conditions. For comparative purposes, mortality statistics might have been a more reliable measure of the prevalence of illness had the case fatality from each disease been an immutable quantity. Fortunately, with the development of medicine and sanitation, the ratio between cases of death and cases of illness changes and the disparity becomes greater in many diseases as science progresses and the care of the sick improves. In the Hagerstown study referred to, the unsuitability of mortality statistics as an index of morbidity was brought out very strikingly. While 20 per cent of the mortality rate was ascribable to respiratory diseases, 61 per cent of the morbidity rate was due to this cause. The percentage of illness due to diseases and disorders of the digestive system was almost double that of the lethal rate from those causes. These figures illustrate the point as to how misleading mortality statistics may be as indices of morbidity.

This chapter summarizes briefly the available information on the prevalence of disease in the United States and points out the significant changes that have taken place in its

incidence since the beginning of the present century as reflected in the mirror of mortality statistics.

The average person loses on account of illness about nine working days each year. At least 2 per cent of the population is sick at all times. On the basis of a study of disease occurrence among 2023 families in New York City, comprising 8645 individuals, it was ascertained by the agents of the Committee on Public Health Relations of the New York Academy of Medicine that there were 102 cases of complete incapacity and 157 cases of partial incapacity among each 1000 persons during the year; this is exclusive of colds and influenza. The Hagerstown study in which all illnesses were included showed a rate of slightly more than one illness per person per year.

According to the findings of the Ohio Health and Old Age Insurance Commission 20 per cent of the wage earners have a disabling sickness every year. Of those sick for more than seven days, 65 per cent are sick for a period less than four weeks; 19 per cent from four to eight weeks; 7 per cent from eight to twelve weeks; 6 per cent from twelve to twenty-seven weeks; 3 per cent for more than six months, and 1.25 per cent for over one year.

About 3 per cent of the wage earners in this country have tuberculosis; estimates have been made to the effect that a million and a half people have or have had venereal infections and another million and a half are in sub-standard health because of malaria. Six million persons suffer from organic ailments of various sorts. One out of every twenty-five of the population suffers or has suffered from a nervous breakdown or some form of nervous disorder. The 350,000 beds in our state hospitals for the insane are in constant use, and in spite of improvements in sanitation we have about 150,000 cases of typhoid fever annually and over 20,000 cases of smallpox. There are reported every year about 700,000 cases of common communicable diseases of childhood and several

million children suffer from malnutrition, rickets, chorea, and heart disease. All of these more or less accurate estimates serve to bring out the enormity of the problem of disease and the stupendous loss to society it entails. It has been estimated that at least 40 per cent of the existing illness could be prevented if the rules of hygiene were carried out in our individual and communal life and if the available resources of medical science were efficaciously applied. Fisk estimates that, on the basis of demonstrable experience, four adult lives could be saved per annum for every 1000 persons by competent periodic physical examinations and instruction. In a study of the incidence of disease, sight must not be lost of the racial, occupational and economic factors and the mode of life. Some racial stocks are more prone to succumb to certain diseases than others. Adjustment to a given environment is sometimes however, erroneously spoken of in terms of race. Dublin has shown that in the United States the lowest mortality rates are found in the native-born population of native parentage. The foreign born and their native-born progeny do not differ much from each other in mortality rates which are higher than those of the native born of native parents. The Jews and the Italians residing in the United States have very low mortality rates while the mortality among the Irish is almost double that of the native stock. The Jews and the Italians do not readily develop tuberculosis or heart disease, while the highest rates for these two diseases are found among those born in Great Britain, Germany and Ireland. In relation to both of these diseases the Irish make a very bad showing; their mortality from these conditions coming nearer to that of the negro than of the white stocks. On the whole the negro is more susceptible to disease and succumbs more readily than the white man. There are a few exceptions to this general rule. There is less prevalence of diphtheria, scarlet fever, and measles among negro children

TABLE 1

TOTAL NUMBER OF FAMILIES AND INDIVIDUALS AND THE NUMBER AND TYPE OF INCAPACITY—TABULATED BY ECONOMIC GROUPS

1918	Economic Group	Weekly per Capita Income	Number of Families	Number of Individuals		Families Having Illness		Partial Incapacity				Complete Incapacity					
								Families in Which It Occurred		No. of Cases	Cases per 1000	Families in Which It Occurred		No. of Cases	Cases per 1000	No. of Maternity Cases	No. of Cases per 1000 Families
				Total No.	Aver. No. per Family	No.	Per Cent	No.	Per Cent			No.	Per Cent				
New York City	A	Less than $4.50	166	969	5.8	142	85.5	74	44.6	124	128	101	60.8	239	247	44	265
	B	$ 4.51 to $ 6.50	488	2495	5.1	404	82.8	231	46.9	390	156	305	62.7	633	254	121	248
	C	$ 6.51 to $ 8.50	475	1995	4	375	79	224	45.2	361	181	271	54.7	562	282	100	202
	D	$ 8.51 to $10.50	331	1216	3.6	236	71.3	128	38.6	178	146	171	51.6	300	247	59	178
	E	$10.51 to $15.50	253	788	3.1	173	68.4	98	34.7	132	167	114	45	190	241	28	115
	F	$15.51 to $20.50	57	170	3	41	72	19	33.3	30	177	29	50.8	49	288	9	158
	G	$20.51 plus	32	114	3.5	23	72	12	36.8	17	149	16	50	28	246	3	94
	Income not determined		221	898	4	147	67	97	43.8	130	145	87	39.3	173	195	23	104
			2023	8645	4.3	1541	76.2	883	43.6	1362	157	1094	54	2174	251	387	191

than among white children, less of acute anterior poliomyelitis, but more of whooping cough. There is a lesser mortality among negroes than among the whites from erysipelas, anemia, and cancer of the skin; but this does not hold true of other cancers. The teeth of the negroes are less susceptible to decay than those of the whites and the negroes are far better operative risks than the whites. The Jews and the negroes are highly susceptible to diabetes.

In spite of the fact that there seem to exist certain racial or hereditary immunities and susceptibilities, the effects of environment and habits of life as well as economic status play perhaps a much greater part in morbidity than race, although this has been disputed by some biologists. The entire public health movement is predicated on the environmental premise. Whether we deal with a race greatly susceptible to tuberculosis or one which is more resistant to it, we find a lesser incidence of the disease among those enjoying better income and all that goes with it, than among the poor of the same race. There exists a definite correlation between the amount of income and the incidence of disease. The studies of the Illinois Health Insurance Commission have brought this out strikingly and it has been borne out by a similar study made by the Committee on Public Health Relations of the New York Academy of Medicine. Table I indicates that in lower economic levels there is proportionately more illness.

No age group is more responsive to its environment than the infant group. The Children's Bureau of the Federal Government has gathered some interesting data bearing on this point. The following table II summarizes the data of a number of studies in various communities in this country and clearly demonstrates the inverse ratio between the earnings of the father and the infant mortality.

TABLE II

INFANT MORTALITY RATES BY CAUSE OF DEATH AND EARNINGS OF FATHER

Earnings of Father per Annum	Live Births	Infant Deaths	Intant Mortality Rates[1]						
			All Causes	Gastric-Intest. Diseases	Respir-atory Diseases	Early Infancy	Epid. & Other Commun. Diseases	All Other Causes	Neonatal Mortality Rate[2]
Total	21,536	2,368	110.0	32.3	19.2	35.9	6.8	15.7	44.4
Under $450	3,085	515	166.9	60.6	33.4	43.8	12.3	16.9	55.8
$450–$549	2,827	355	125.6	44.9	23.3	35.4	6.4	15.6	46.0
$550–$649	2,908	339	116.6	36.5	18.9	37.5	9.3	14.4	43.3
$650–$849	5,050	543	107.5	27.1	19.6	37.4	5.5	17.8	46.5
$850–$1049	3,345	277	82.8	19.7	13.5	30.2	4.2	15.2	38.0
$1050–$1249	1,391	89	64.0	8.6	7.9	25.9	3.6	18.0	33.1
$1250 and over	2,252	133	59.1	8.0	6.2	32.4	2.2	10.2	38.2
No earnings	313	66	210.9	86.3	47.9	41.5	16.0	19.2	60.7
Not reported	365	51	139.7	41.1	16.4	49.3	16.4	16.4	41.1

[1] Deaths under 1 year per 1000 live births.

[2] Deaths under 1 month per 1000 live births.

TABLE III

COMPARISON OF PERCENTAGE DISTRIBUTION OF THE PRINCIPAL DISEASE GROUPS AMONG THE SEVERAL OCCUPATIONAL CLASSES

Diseases	All Patients (15 Yrs. Old and over), Per Cent	Outdoor Workers, Per Cent	Indoor Workers, Per Cent	House-wives, Per Cent	Unoccupied Patients, Per Cent
General diseases:					
Epidemic, endemic and infectious	4.6	8.1	6.6	2.4	4.2
Not included above	10.0	12.8	11.9	8.0	11.0
Diseases of the nervous system	4.7	4.8	6.0	2.9	8.2
Diseases of the circulatory system	7.0	7.8	9.2	4.3	11.0
Diseases of the respiratory system	5.1	8.6	6.8	2.9	6.4
Diseases of the digestive system	25.0	21.9	35.6	14.7	36.4
Diseases of the genitourinary system	10.8	4.4	8.4	13.9	10.1
Diseases of the skin	1.5	3.2	2.3	0.6	1.6
Diseases of the bones	1.5	2.7	1.9	0.9	1.9
Accidents	6.5	24.3	7.4	3.0	6.0
Puerperal state	22.2	....	2.5	45.4	2.8
Ill defined, not stated, etc	1.1	1.4	1.4	1.0	0.4

The effect of occupation on morbidity is well known. A statistical study by Corwin and Conover of 14,000 adult patients cared for in six hospitals in New York City has shown how different the percentage distribution is among outdoor and indoor workers in relation to the several major disease classifications. Table III is reproduced here (p. 25) for ready reference.

The British mortality statistics by occupations clearly illustrate the hazards of occupations. Table IV shows that the agriculturist is in a favored occupational position as compared with other occupations. The file maker suffers from plumbism and has also an extremely excessive mortality from diseases of the genito-urinary system; he also suffers much from respiratory diseases. The potter has a high death rate from respiratory diseases (including lung tuberculosis), as well as from lead poisoning. The plumber is subject to lead poisoning and pulmonary tuberculosis; he shows, however, a low rate for diseases of the respiratory system. The tin miner has an extremely high mortality

TABLE IV

MORTALITY STATISTICS ILLUSTRATING OCCUPATIONAL HAZARDS

	All Causes	Phthisis	Diseases of Respiratory System	Diseases of Urinary System	Plumbism	Accident
All males	1000	186	174	52	1	59
Agriculturist	585	172	121	38	0	33
File maker	1609	367	315	152	58	42
Potter	1540	285	473	53	10	33
Plumber	1041	203	152	86	23	48
Tin miner	2160	851	735	71	..	58
Stone, slate quarrier	896	186	202	39	..	97
Coal miner	939	98	261	31	..	136

which is almost entirely the result of lung diseases. The stone and slate quarrier is subject to the same risks as the tin miner, but to a lesser extent. As is well known, the coal miner is immune, to a large degree, from lung tuberculosis, but suffers from other forms of respiratory diseases. He likewise incurs a great risk from accidents.

The etiological relationship between nutrition and disease is illustrated by a number of striking examples brought about by the World War. In the Central Empires the increased prevalence of scurvy, rickets, xerophthalmia, trench edema, and other diseases furnished abundant evidence of the importance of balanced and complete diets. Recent studies of the several deficiency diseases have established this fact beyond doubt. On the other hand, the dietary restrictions thus forcibly imposed upon the people of the Central Empires resulted in a diminution of obesity, diabetes, and certain other disturbances of metabolism.

Bearing in mind the very marked inverse correlation between family income and the incidence of pellagra and remembering also the marked prosperity of the Southern States toward the close and immediately following the World War, it may be significant to note that the reports indicated a considerable decrease in the pellagra death rate among Southern policyholders of the Metropolitan Life Insurance Company during 1919.

The relationship between housing and health, although generally recognized, has not been statistically demonstrated in view of the difficulties involved. The nearest approach to it is a study made by Clark in the City of Liverpool which showed a much lower infant mortality and tuberculosis rate among the population living in the modern dwellings erected by the Housing Corporation against the general population of the City, particularly that part of it which lives in the slum section. A similar study made in 1921 in

Detroit, Michigan, brought out clearly the relationship between sanitary environment and infant mortality, tuberculosis, and pneumonia. The study likewise corroborated the now well-established fact as to the relation of light to the development of rickets and the general welfare of child life.

Personal cleanliness, another important phase of hygiene, the character of which is influenced by social and economic conditions, is intimately related to health and disease. The rôle played by this factor was demonstrated by the increased incidence of typhus fever, trench fever, and itch in Europe during the War. In passing, the rôle played by proper care of the teeth in the prevention of dental caries may also be mentioned.

The effect of sanitary disposal of wastes on elimination of cholera, dysentery, and typhoid fever, and the destruction of mosquitoes on the incidence of malaria and yellow fever should be mentioned merely to emphasize how important are the environmental factors in relation to the prevalence of disease. Mention should likewise be made in this connection of vaccination against smallpox and the prophylactic treatment of diphtheria and certain other communicable diseases.

Rivers calls attention to the incidence of encephalitis in vaccinated persons which it may not be amiss to refer to in this place as it points to the desirability of administering the Jennerian prophylaxis during the first year of life. In England the ratio of encephalitis cases to vaccination is approximately 1:50,000, while in Holland it is 1:5000. The ten times larger number of post-vaccinal encephalitis incidence in Holland as compared with England is ascribed to the fact that in England the majority of children are vaccinated in infancy while in Holland the inoculations are made in children just under the school age. This, coupled with the observation that the large proportion of post-vaccinal encephalitis occurs in children in the third, fourth, or fifth years of life, leads to

the conclusion that infants under one year of age are relatively insusceptible to post-vaccinal encephalitis.

Contrary to common expectation, the United States with all its wealth and the attention that is being paid to the cause of public health, ranks tenth in mortality. Nine countries have lower death rates than that of the United States and these in the order of priority are: New Zealand, Holland, Australia, Norway, Denmark, Sweden, Canada, England and Wales, and Switzerland. The United States had a general mortality rate of 12.1 per 1000 estimated population in 1926 which dropped to 11.4 in 1927 and has slighly increased in 1928. New Zealand has a death rate of about 8 per 1000 population.

In a comprehensive statistical study, John K. Gore, of the Prudential Insurance Company of America, has made an interesting analysis of the trend of mortality by quinquennia in thirty-two countries since 1901. Except in Bulgaria, Ceylon, Chile, Jamaica and Japan, there has been a general reduction in the death rates of all countries, though more pronounced in some countries than in others. The differences in the mortality rates between countries are enormous and can be illustrated better by tables of life expectation than by mortality rates. Thus for example, of 100,000 boys born alive in Denmark more than half will be living at the age of sixty-five, while of a similar number of boys born in British India more than half will be dead at the age of eleven.

Table v gives the expectation of life at various ages for males and females in the United States in 1926.

According to this table the average expectation of life for a boy is fifty-six and a half years, while for girls it is a little over fifty-nine years. After the first, which is the most hazardous year of life, the expectation of life increases to 59.65 years in the case of boys and 61.48 in the case of girls. From then on, the expectation is decreasing, although at the age of five it is still greater than at birth in the case of boys

TABLE V

EXPECTATION OF LIFE AT SPECIFIED AGES

Males and Females in United States Registration States, 1926

Age	Males	Females	Age	Males	Females
0	56.51	59.09	30	35.94	37.53
1	59.65	61.48	40	27.87	29.43
2	59.50	61.25	50	20.39	21.70
3	58.88	60.60	60	13.75	14.73
4	58.14	59.83	70	8.49	9.17
5	57.33	59.01	80	4.84	5.15
10	52.93	54.51	90	2.84	2.84
20	44.22	45.72	100	1.73	1.83

and but slightly less than at birth in case of girls. At the age of sixty-five a little more than half of the 100,000 born in 1926 will still be living. At all ages, except at the period of pubescence, women have lower mortality rates than men and greater expectation of life, although women have a higher disability incidence than men. There are only a few countries, namely Bulgaria, Ceylon, Ireland, Japan, and Uruguay where the mortality among females is greater than among males.

In this connection, it may be worth while to stress the fact that the United States has a much higher mortality rate from puerperal conditions generally and from puerperal septicemia in particular than most of the civilized countries of the world. Figure 1 illustrates this fact very strikingly. While Holland and the Scandinavian countries have a maternal mortality rate of 2.5 per 1000 live births, our mortality rate is 6.7. The puerperal septicemia death rate is in the same countries less than 1 per 1000 live births, ours is 2.5.

While our general life expectancy increased from 48.23 years at birth for boys in 1901 to 56.51 in 1926, we have not

made much progress in the improving of the life span of those who reach middle life. While our mortality from

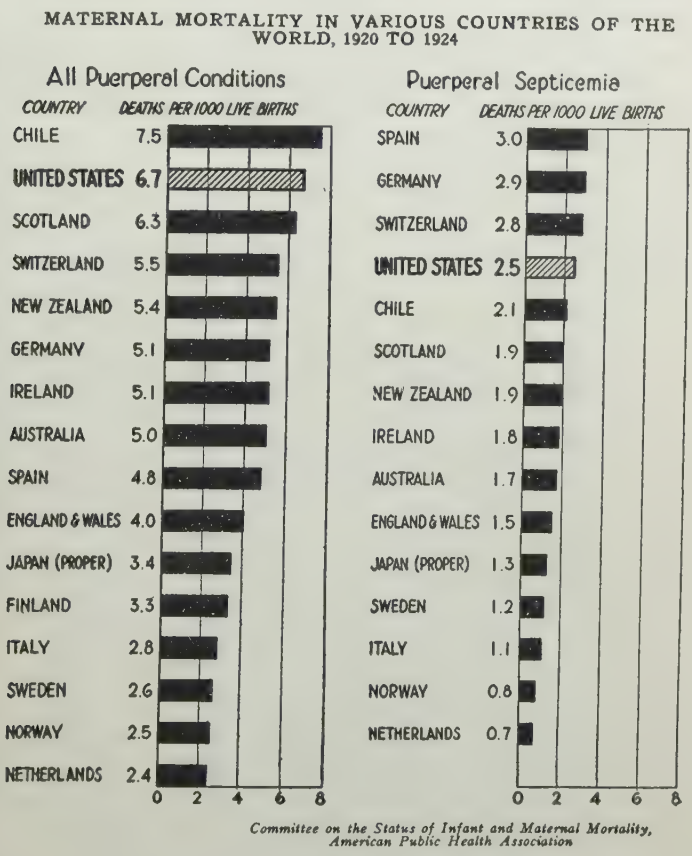

FIG. 1.

tuberculosis has declined precipitously, our mortality rates from cancer, heart disease, arterial diseases and cerebral hemorrhage have increased. In fifteen years, tuberculosis

has been relegated from its first position as a cause of death to the seventh place. Numerically as many people died in the United States from tuberculosis in 1925 as in 1910, but the rate per 1000 of population decreased considerably. Heart disease assumed the first place, followed by cerebral hemorrhage and arterial disease; and nephritis and Bright's disease, from a fifth largest cause of death in 1910, became

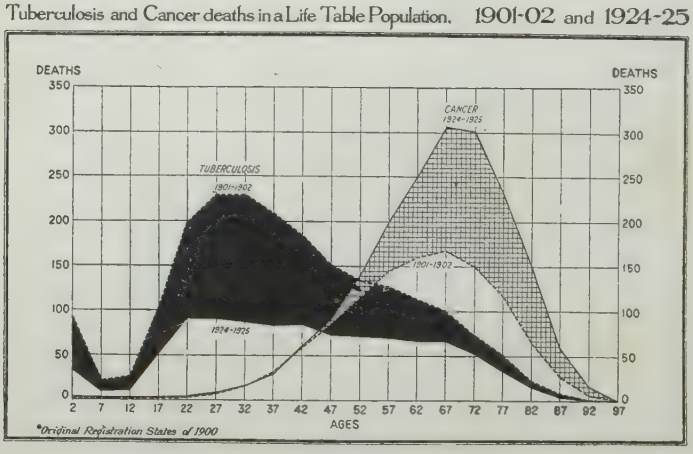

FIG. 2.

the third in 1925. Pneumonia is a close second, followed by cancer which, from a ninth cause of death in 1910, rose to the fifth position in 1925, and this increase is not due solely to better diagnosis and the large number of older people in our population; it is a gradual and real increase.

Figure 2 illustrates the concomitant decrease in the prevalence of tuberculosis and increase in that of cancer. In the January 1929 issue of the *American Journal of Hygiene*, Pearl calls attention to this antagonism or incompatibility which

seems to exist between the two diseases, tuberculosis and cancer, on the basis of autopsy findings. One of the several carefully guarded conclusions is to the effect that in the autopsy experience of the Johns Hopkins Hospital, persons who had tuberculous lesions of any degree of activity whatever showed a relative incidence of cancer and other malignant tumors only a little more than half as great as that exhibited either by persons with no tuberculosis discoverable at autopsy, or by those who have only old, healed tuberculous lesions.

Biostatistical studies have in the past and will no doubt in the future throw a great deal of significant light on the problems of morbidity and mortality which, in the interest of humanity, medical study and research must solve.

CHAPTER III

LABORATORY AIDS

FREDERIC E. SONDERN, M.D.

WHILE some laboratory aids in the diagnosis of disease are nearly as old as diagnosis itself, it is within the last quarter of a century particularly that clinical pathology has progressed sufficiently to become of definite use in practically all types of medical diagnosis, and indispensable in some. This development is the result of research in pathology, bacteriology, serology, and biological chemistry. Technical procedures taught by other sciences also aid in this regard. Thus clinical pathology now requires lengthy special training and experience in addition to the usual medical curriculum, justifying the creation of it as a separate specialty in medicine.

The brilliancy of laboratory achievement in the elaboration of the knowledge of disease and its causes, and also in its early and more accurate recognition, is generally admitted. The employment of laboratory aids in diagnosis must be associated with a clear understanding not only of their significance but also of their limitations, and under no circumstances justifies neglect in the use of physical signs and the mental acumen characterizing the able diagnostician. In modern medical education the enthusiasm to teach the signal advantages of accurately executed laboratory aids in diagnosis is great, and the benefits are readily obvious to the student. Too often, however, the student does not realize that the selection and interpretation of what has been done is due directly to the clinical ability of the teacher. Acquiring this clinical ability is a laborious and time-consuming task, and with the extensive curricula of today it

often does not receive the attention or emphasis it deserves. In consequence it may happen that the physician, perhaps not so well versed in signs and symptoms or not so willing to give them the time they deserve, places more burden than is justified on a laboratory procedure, which, all said and done, should be used as a diagnostic aid only. Clinical practice should be aided by clinical pathology, but not dominated by it.

Laboratory aids are also of value in the different branches of preventive medicine which is the physician's broader field for the benefit of mankind in the saving of life, the minimizing of suffering, and the prevention of waste. In the hurry of everyday life and oversight of the benefits of periodic examination, the beginnings of disease are still largely neglected even by the more intelligent members of the community, and this is one of the important tasks of public health education. The problems in preventive medicine before the public and the profession today still remain many, and in a large number of these laboratory aid is available in the solution. Unfortunately these problems are not all concrete or even completely understood and they are not all the concern of one person or group. The degree of effectiveness in the safeguarding of health will depend on the cooperation of State, community, and citizen. It is the physician who is in position to bring about a union of these interests, and his activity in this regard will in no small measure determine the success of the outcome.

In considering the subject of laboratory aids in preventive medicine, it is essential to deal with those aids useful in the external influences inimical to health, those in the preclinical recognition of tendency to disease and those useful in relation to the prevention of complications which may arise in the course of disease.

External Influences Inimical to Health. Among the external influences concerned in the maintenance of health are water

supply for drinking and bathing, sewage and garbage disposal, air supply and its contamination with smoke, carbon monoxide and other motor exhausts, light, food supply and its quality, care in handling and deleterious admixture, and the hazards of industry.

Water. The control of the community water supply by the City or State Department of Health by means of sanitary supervision and periodic chemical and bacteriological examination has been the most potent factor in decreasing the morbidity and mortality in water-borne diseases such as typhoid, paratyphoid, dysentery, cholera, etc. The sanitary supervision is the engineer's problem of going over the ground to determine source, method of conveyance, and actual and potential causes of contamination. Aside from the general physical and chemical properties suitable for potable water, the laboratory determines the presence or absence of evidences of contamination. These evidences are chemical and bacteriological. The chemical determinations indicative of contamination are found in the amounts of organic matter, nitrates, nitrites, chlorine, and the relation of free and albuminoid ammonia. Bacteriologically the total number of bacteria and the presence or absence of members of the colon group are generally determined. If the latter are present, specific determinations of the type are made with special regard for typhoid and paratyphoid bacilli. In many instances it is necessary to purify the water supply by one of the various methods available for this purpose such as chlorine, electric ray, etc., and these procedures are also supervised by the same authorities for efficiency and the avoidance of harmful influence.

Experience teaches that when this work is constantly well done the result is practically perfect and well merits the expense, but there still remain some public water supplies not yet efficiently controlled which are a constant men-

ace to health. In the communities where the people are enlightened in these matters through public health education, pure drinking water is demanded. The fact that a citizen brought suit for damages against his city because he contracted typhoid fever from the water supply during a brief period in which the purification plant was said to be out of order, is an example of this public demand. On the whole, however, the urban water supplies are now well protected, and instances of water-borne disease are no longer common. Occasionally small epidemics do occur during temporary breakdown of purifying plants, lessened vigilance on the part of the authorities, and accidental admixture of non-protected sources with the community supply, as in times of flood.

Rural water supplies, on the other hand, are not infrequently contaminated still. The work of public health education in this regard is not yet complete and instances in which sanitary inspection and laboratory control of individual water supplies occur are the exception and not the rule. The frequency with which deep driven wells are replacing the old shallow dug well is a step in the right direction, as the former when properly shielded at the surface is much less liable to contamination. Sewage also has better care now than formerly and leakage into the water system is much less liable to occur. Both the water and sewage systems may, however, be damaged by severe frost, pipe corrosion, and what not, and it is exceptional that a water supply can be considered absolutely safe without periodic sanitary inspection and laboratory control.

Instances of water-borne disease resulting from infection while bathing in waterways contaminated with sewage are not uncommon, particularly adjacent to large communities, and the subject is one which gives the health authorities considerable concern. It is not an easy problem to decide

without hardship, to what extent contamination can be prevented and where bathing should be forbidden. The legal enforcement of such decision is also not simple. Laboratory examination of water of this kind forms the basis for the opinion of its fitness for bathing purposes, and tests showing unduly high bacteria counts or chemical and bacteriological evidence of sewage admixture must be viewed with concern, even if organisms which are the direct cause of disease are not recovered. The artificial swimming pools maintained by clubs, hotels, etc. in the larger communities are also subject to license, regular sanitary supervision, and laboratory control. A preliminary shower with the use of soap and previously washed bathing suits are demanded. When properly conducted the water shows bacteria counts generally below 100 per c.c. and no colon bacilli in 10 c.c. The legal requirements in New York guard against contamination by bathers and do not allow bacteria counts in excess of 500 per c.c. and colon bacilli in more than three out of ten 1 c.c. samples in a day.

Sewage and Garbage. The menace of sewage, as ordinarily disposed of, lies chiefly in it as a potential cause of water pollution. The sanitary law making it mandatory to disinfect properly all waste material from cases of communicable disease is sound fundamentally and deserves strict observance. It is the neglect of this ordinance that is primarily the cause of water-borne disease. Modern plumbing practically eliminates sewer gas, that bugbear of half a century ago to which not only all communicable diseases but also other maladies were ascribed, but which is now considered little more than a bad smell. Sewage disposal is a very important sanitary engineering problem and while much progress has been made we have not yet reached the goal of universally clean drinking water, clean rivers and harbors for bathing purposes, and the survival of desirable water life.

Laboratory aid in determining the quality and danger of sewage is of decided assistance to the sanitary engineer in his problem regarding sewage disposal.

Garbage handling and disposal, when improperly conducted, may also be a health menace and not merely a nuisance. The open garbage pail is a feeding place and possibly a breeding place for undesirable insects capable of transmitting bacteria. The open garbage cart, especially on windy days, is often the cause of eye infections and probably respiratory disorders. No fault can be found as a rule with the existing sanitary laws concerned in practically every community, but the lack of proper observance is frequently a cause for complaint even in the larger cities.

Air. Contaminated air, except as the result of industry in factories, etc., is an urban problem. City air is made impure by various admixtures, of which soft coal smoke and carbon monoxide, as well as other objectionable gases in motor exhausts, are the chief ones. Laboratory methods are available accurately to demonstrate the concentration in the air of these unhealthful substances, and are the basis of the demands for relief. This offers a difficult problem for the sanitary engineer. Smoke-consuming devices are relatively costly and objected to not only for this reason but also on account of not being considered practical by many. Smoke in the automobile exhaust can be prevented by care which should be mandatory. Carbon monoxide and other poisonous gases in automobile exhausts, on the other hand, cannot be eliminated as long as the present motor fuel is used. Fortunately these dangerous gases disseminate quickly in the open air. The danger to health and life exists where this rapid diffusion is prevented by inadequate ventilation as in garages and other closed spaces. The air in congested streets under certain conditions of the atmosphere occasionally shows a decidedly unhealthful concentration of motor exhaust gases, and this

caused Professor Henderson of Yale to recommend that the automobile exhaust should be delivered into the air at a point above the heads of pedestrians, but such smokepipe devices are not popular with the automobile maker or user.

Light. The desire for abundant normal sunlight and daylight is universal for both work and play. Impaired or absent daylight provokes eyestrain, pallor of the skin, and more subtle evidences of unhealthfulness, even if the artificial illumination is ample and well distributed. The masses of the people who go from a hasty breakfast by subway to the lower floors of a skyscraper situated among skyscrapers, work the whole day by artificial light, and return home by subway to arrive in darkness, are deprived of at least one source of health to say nothing of air and exercise, and they show it. Daylight saving during the summer months has remedied this somewhat and deserves greater support than it has. Since the advent of phototherapy the subject of light and its influence on health has been given greater attention. The benefits to health of the ultraviolet rays of the sun have had special study, and laboratory means now exist to determine not only the presence but also the intensity of these rays at any given time and place. Various makes of window glass are now being placed on the market to be used instead of ordinary window glass which does not pass these ultraviolet rays. While conservatism may demand holding judgment in abeyance until more is known about the value of this new glass, the fact remains that sunshine through it will fade fabrics more quickly than that through ordinary glass, and a family pet dog shows his preference by always lying in it. If it is true that the screen of smoke and gases prevents the penetration of the ultraviolet rays of the sun to the building level in New York City during the winter months, this should be another argument in favor of abating this obstruction as far as possible in the interest of public health.

Food. The need of unadulterated food for the good of public health is indicated by the various stringent pure food laws as well as those to prevent misbranding, and the unusual activity of Dr. Wiley some years ago for strict enforcement still has a beneficial influence on all concerned. The industrial chemist has devised many less expensive substitutes for certain staples so that ice cream can be made without cream, butter without the aid of a cow, eggs without the need of a hen, and so on, and while there may be nothing injurious in these products, the consumer has a right to know what he is buying or eating as the case may be. The more careful handling of food, especially in markets and slaughterhouses, the sanitary regulations affecting food handlers, the lure of the attractive individual container, the improved knowledge of the housewife concerning food by reading newspaper and magazine articles on good housekeeping and hearing radio talks on the same subject, and improved refrigeration and kitchen sanitation, have all contributed to better and cleaner food, wholesomely prepared by clean hands. Disease "carriers," notably typhoid carriers, employed as cooks or other food handlers have on account of unclean hands been the cause of small epidemics in families, hotels, or institutions with consequent cost of health and even life. In recent years physicians have also given more detailed attention to food and the prescribing of diets to suit individual requirements with due regard to vitamins, calcium and iron content, and the like instead of, as formerly, simply forbidding certain foods and leaving the choice of substitutes to the patient's knowledge or fancy.

Milk probably conveys a greater variety of infections than any other one foodstuff. It is an excellent medium for the growth of bacteria, and owing to the extensive distribution of one lot of infected milk the serious results may be widespread indeed. As in the case of drinking water, the legal

control of the milk supply by sanitary supervision and laboratory check is satisfactory in practically every community of any size, and the shortcomings are in the enforcement rather than in the standards. These requirements concern not only the purity of the milk but its nutritional value as well. The single tuberculous cow kept for the use of the single family of small children is still a menace to be gradually eliminated by public health education.

Food Poisons. The changes in food which render it poisonous are in the majority of instances believed to be due to the development of bacterial toxins, though oftentimes the causative bacteria cannot be demonstrated. The production of poisonous amounts of these toxins may be quite rapid. The possibility that unknown chemical changes not due to bacterial growth may be the cause of food poisoning is not yet excluded, and justifies using the term food poison rather than ptomaine poison in many of these cases. In recent years there have been many cases of botulism due to the toxin produced by the bacilli of like name. This organism develops a poisonous amount of its toxin slowly in improperly preserved meat, vegetables, or fruit where the sterlizing process was incomplete. A recent analysis of cases of this poisoning shows that it was much more frequent in home-preserved vegetables than in the commercially canned products of the factory.

Hazards of Industry. The dangers of occupation to health are many and they have become more complex as industry has extended its scope and increased its high pressure activity in the interest of efficiency and economy. The employer has come to realize the value of health and happiness in his employes as an asset, and his increasing efforts in this regard are one of the outstanding features of merit in American industry. The subject is an important one and is detailed in another chapter.

Preclinical Recognition of Tendency to Disease. In a broad view of this subject it is apparent at the outset that in practically every instance some sort of laboratory examination is required to aid in determining evidence of a tendency to disease. Dr. Exton of the Prudential Insurance Company is the author of the statement that a statistical study of a large number of periodic health examinations made by the representatives of his Company demonstrates that people healthy enough not to complain of any symptom or discomfort, but who show abnormal physical signs, are rare as compared with the unexpectedly large number who are found to have significant health impairment by laboratory tests. Granting this, it seems imperative that laboratory aid should form a part of every health examination, periodic or otherwise.

Obviously it would not be possible to review here the laboratory procedures called for in any clinical or preclinical examination, as this would require a review of the entire subject of medicine. In the final analysis these laboratory aids remain handmaidens to the clinician, no matter how important they are for unerring success. Their true value depends on their proper selection and interpretation as well as on their faultless execution. It is the duty of the clinician to realize the aid thus obtained in the making of an early and accurate diagnosis. Some of the tests are simply confirmatory in a positive or a negative way, while others are imperative for complete diagnosis. The accurate selection of what help of this character is desirable or necessary in a given case is as essential to the complete performance of duty as any other phase of the diagnostic procedure. The proper interpretation of the result obtained from laboratory tests likewise requires study and experience and is also essential to the complete performance of duty. The more efficient laboratory facilities are generally under the direction

of a clinical pathologist who should be a specialist, not only in the technic of the various types of laboratory investigation, but also in the latest developments of the practical application of laboratory aid in diagnosis and the interpretation of the results thus obtained.

Considering the result of a laboratory examination a complete diagnosis remains a common error, in fact it is a growing error. While illustration seems unnecessary, one example will suffice. A culture from the throat of an individual is sent to the laboratory and what are believed to be diphtheria bacilli are found. Does this alone justify a diagnosis of diphtheria? In a very large majority of the cases diphtheria will be the final diagnosis. It may be, however, that this individual is a carrier of diphtheria bacilli, himself immune, and he may at this time be suffering from a totally disassociated malady of which there is no evidence in the culture examined. Again it may happen that the bacteria found are nonvirulent and relatively harmless to him. This is no argument against the value of the culture or an indication that it should be omitted, but simply emphasizes the fact that the culture is but one part, though possibly the most important part, of the diagnostic procedure. Take the case of diphtheria in which a negative culture is obtained, which happens now and then. There is no question here that the attending physician and not the laboratory takes the responsibility of the diagnosis.

Granting again the importance of laboratory aid in diagnosis, it is unfortunate that the medical profession is not insistent enough in the matter of the qualifications of the laboratories and the laboratory workers. There is no exaggeration in the statement that the majority of clinical laboratories are not completely trustworthy on account of more or less technical incompetence and inexperience of the workers. The highly technical developments of recent years have

made the work more difficult and exacting than formerly, thus requiring greater skill which in turn demands better fundamental training and longer experience on the part of the laboratory personnel. In some instances the State has established standards for laboratories in the interest of public health, and the American Medical Association and various local societies have done the same. The resulting lists of "approved laboratories" deserve greater attention from the medical profession than they have yet received.

Routine urine examinations should not only be used to determine the presence or absence of albumin and casts or of sugar and evidences of an acidosis, but relatively unimportant signs should be followed up for explanation to exclude beginnings of disease. For example, unduly concentrated or unduly dilute specimens, persistent alkaline reaction, disproportion between specific gravity and relative amounts of urea and chlorides, slight traces of albumin without blood, pus, or casts, the presence of albumins other than serum albumin under like conditions, persistent excess of indican, presence of acetone, pseudo-sugar reactions, other than transient crystalline deposits especially in dilute specimens, constant or intermittent presence of even few blood or pus cells, and a host of similar signs may, on the one hand, be the earliest indications of disease processes or, on the other, be explained by transient and trivial circumstances.

While in no sense preclinical, it is noteworthy that routine careful and complete urine examinations frequently lead to the diagnosis of an unsuspected renal tuberculosis in which the relatively slight clinical symptoms have not been brought to the attention of the physician.

It is also short sighted to examine a urine specimen for one or other ingredient only. In this way an important diagnostic suggestion may be overlooked, to say nothing of the notion this examination may give the physician that the urine has

really been examined. An unconscious baby was catheterized and the specimen examined for albumin and casts, but this incomplete analysis delayed the aid to the diagnosis of diabetic coma obtained from a complete analysis six hours later.

Periodic urine examinations with or without blood examinations are still regarded by the public and a decreasing number of physicians as health examinations, in lieu of what is now considered a complete health examination. With due regard for the earliest signs of health impairment often obtained in this way, the complete examination of the individual is obviously the proper procedure and should be urged in every instance.

Routine blood examinations merit the same detailed consideration as urine specimens. While the determination of the hemoglobin percentage only may have clinical value, it is often the cause of delay in the early diagnosis of pernicious anemia or leucemia. It is a strange fact that clinical pathologists can only rarely present a record of the earliest stages of typical blood diseases which have an insidious beginning. Slight secondary anemia is often the first clinical evidence of an unsuspected serious lesion, and is too frequently believed to be explained by errors in diet, fasting for loss in weight, excesses in tobacco, dancing, and what not. Relatively unimportant signs noted in blood examinations should also be followed up for explanation to exclude the beginnings of disease. For example, persistent slight leucopenia, slight leucocytosis, derangement in the differential count such as relative lymphocytosis, slight polynucleosis, persistent slight large mononucleosis, absent or increased eosinophile percentage, abnormal deviations in color index, and so on. These changes may be the earliest indications of disease processes or may also be explained by transient and trivial circumstances.

Disease Carriers. Diphtheria bacilli are found relatively frequently in the nose and throat secretions of persons not

suffering from this disease. The same may be said of the organisms of cerebrospinal meningitis. Persons who have had typhoid fever may continue to have virulent organisms in their intestinal contents for years afterward. Many of these so-called carriers are known to exist and their ability to transmit the disease to susceptible persons is recognized. It is also reasonable to suppose that there are carriers of other communicable diseases whose existence has not yet been established. These ostensibly well persons are a menace to public health and the problem of how to discover them in more than isolated instances, as well as how far it is legally possible to go in compelling them to undergo the treatment necessary to make them safe for public contact, is one of the difficult public health problems of our time. Moral suasion rather than legal command seems the best method for the moment, at least until their actual menace to society is clearly established.

Focal Infections. The fact that focal infections are responsible for numerous disease manifestations has made the search for pathogenic organisms popular, particularly in suspicious looking teeth, tonsils, and sinuses. While the presence of such organisms in one or other of these places does not of course indicate positively that they are the cause of the remote lesion, and complement fixation tests, though positive, are of no help in this regard, the removal of such foci of infection remains one of the outstanding successes of today in preventive medicine.

Prophylactic Inoculations. Vaccination to establish immunity to smallpox, the Pasteur treatment to prevent the development of rabies, the use of toxin-antitoxin to establish immunity to diphtheria, the use of vaccines to establish immunity to typhoid, paratyphoid, and a host of other bacterial invasions are probably the chief prophylactic measures of this kind in general use. Additional procedures

of like nature and value are constantly being proposed. The question of just how much immunizing the physician should recommend to a given person in the interest of prophylaxis is becoming a problem of some magnitude about which there is some difference of opinion.

Biopsy. The teaching of the danger of metastatic infection resulting from the removal of a portion of a malignant growth for histological diagnosis some time prior to actual operation has largely eliminated this procedure. The modern renewed effort compelling the surgeon to train himself to recognize malignant tissue in the gross is a step in the right direction, but statistics show his inability, and that of the pathologist as well, to do this in all cases. Conservatism in surgery on the one hand and the need for actual complete removal of malignant disease on the other make tissue examination at the time of operation most desirable, and with the improved technic of today a practical warranty of accurate result, there is little excuse for its omission.

Wassermann Test. A blood examination to aid in determining the presence or absence of syphilis is frequently part of a health examination. While it is without the slightest doubt one of the most valuable diagnostic aids we have, the habit of accepting the result as final without going through the tedium of an examination such as was customary before this serological aid was known, is a common error. A certain number of cases of latent syphilis have a negative serological reaction at the time of examination, while a few others have fluctuating reactions, negative at one time and positive at another. This latter class, small as it is, has discredited many a laboratory and many a serologist in the minds of medical men. There are also certain more or less known states and conditions, and probably some that are not known, which will cause a reaction to be negative which should be positive.

The constant effort to increase the sensitiveness of serological tests for syphilis has probably increased somewhat the very small incidence of false positive reactions, though this is stoutly denied by most serologists. The fact remains that a very small number of positive reactions are obtained in cases without a specific history and negative on searching physical examination. This creates a difficult situation in which the physician's tact is severely strained, and proves again the desirability of accepting laboratory aids as a part of, but not as the whole, diagnostic procedure.

Complications in the Course of Disease. Laboratory diagnostic aids are particularly valuable as first intimations of complications, especially in the course of acute diseases and after surgical interventions. It would not be possible to detail them here, as this would mean a review of the entire subject of medicine. Excellent as the modern textbook on general medicine is, its arrangement does not lend itself to rapid reference in the matter under consideration. Special books on clinical pathology formerly detailed the technical procedures concerned in orderly fashion, but the matter of clinical value was not well arranged for reference. Of late, however, several books on clinical pathology have appeared which are written in two parts, the first dealing with the technical work and the second presenting the different diseases and conditions with an enumeration of the laboratory aids in diagnosis and prognosis concerned, systematically arranged. This latter feature is of such practical value that undoubtedly more books of this kind will be written by men of wide clinical as well as laboratory experience.

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CHAPTER IV

GENERAL MEDICINE

SAMUEL W. LAMBERT, M.D.

THE application of the principle of preventive medicine to internal diseases demands a knowledge of every speciality. Many of the general diseases have been segregated to the care of physicians who apply their scientific investigation and practice in a limited field. These specialists select their sphere of work largely by limitation thereof on an anatomical basis and devote themselves to the study and treatment of the diseases of a particular body region. But local manifestations of disease are often either the beginning or the sequelae of a general condition, therefore a broad and thorough knowledge of all medicine is an essential to every physician, whether he elects to specialize or not. The general practitioner is still a necessity and the health of the individual citizen must depend largely on his supervision and care. It is important that the layman be impressed with this fact and that he be warned against the too frequent consultation in the first instance with the medical specialist.

It has been emphasized in a preceding chapter that the periodic health examination at the hands of a competent general practitioner is the best method of preventing disease and the most effective guaranty against an economic breakdown. The periodic health examination should become an annual event in the life of every man, woman, and child. The success of preventive medicine of the future will depend on the frequency of such health examinations by a family physician who appreciates to its fullest meaning the interdependence of individual and public health in every specialty of medical art.

Samuel Butler describes, in his novel "Erewhon," a country in which illness is a crime demanding incarceration and isolation of those suffering from any disease, however slight. It is an old story and probably untrue, that the Chinese in the days of their isolation from the world, paid their family physicians a regular stipend as long as no one was ill, and that this honorarium ceased during any sickness in the family until all were well again.

If the newspapers can be believed, a like contract was made with a physician a few years ago by a well-known American man of business. The medical profession is not ready to advise the adoption of such radical measures but it must familiarize itself with and practise every new and important measure which the rapidly developing art of preventive medicine is discovering and applying in public and individual health, devoting itself in the future to preventing illness as well as to curing disease.

In this chapter under the heading of general medicine there will be considered:

General infections; Diseases of the respiratory organs; Diseases of the circulation and the kidneys; Diseases of the digestive tract and of disturbed metabolism, and some diseases of as yet unknown causation.

General infections are caused by the invasion of the body by specific living germs. The exact nature of these causative agents is known in many diseases, but is still unknown in others. The knowledge that a disease is being caused by certain pathogenic organisms does not always lead to any direct specific cure or method of prevention, but it helps materially in both directions. The most brilliant example of such a discovery made without any knowledge of scientific etiology was that of vaccination discovered by Jenner as a preventive against smallpox. This was the first great practical application of immunological principles and antedated any

modern conception of the germ theory by seventy years. In 1863, Davaine published his experiments with anthrax. The present-day methods of preventing and curing disease, by inoculation with modified living germs, or with measured doses of dead bacteria, or by the injection of chemical antitoxins, are not yet of universal application though they are of great help in certain diseases due to infection. The indiscriminate naming of all these specific remedies "vaccines" is a high compliment to Edward Jenner, but it is a misuse of words without thought of etymology.

Another mode of prevention of infections is the destruction of the invading germ soon after its introduction into the body. The principal avenues of invasion are wounds of the skin, which may be severe or more or less slight, the nose and pharynx, the mouth and throat, and the gastroenteric tract. Primary infections of the structure of the nose, mouth, and throat, and of the skin, may remain entirely local for long periods before the germs of disease invade the general circulation and cause the severer types of symptoms characteristic of each pathogenic organism. A general infection may be checked or aborted by the administration of chemical or other destructive agents which overwhelm the invading germs without destroying the struggling body of their host. The introduction of salvarsan by Ehrlich for the treatment of syphilis was such an attempt and although this massive therapy failed as such, a most important addition in the therapeutics of that disease was added to materia medica.

The whole science of Hygiene, both personal hygiene and the hygiene of congested centers of civilization, is involved in the prevention of infectious diseases. The prevention of contamination of water, milk, or raw foods, as well as the insuring of the cleanliness of utensils and of the hands and bodies of cooks and of handlers of food, both raw and cooked, is essential to the reduction of the morbidity and mortality

of all civilized peoples. Special treatment of convalescents from infectious diseases is needed to prevent individuals from becoming "carriers." A "carrier" is a person in apparent health who harbors in his body active pathogenic germs, which do not cause harm to their host but are a permanent menace to those about him. The Boards of Health which require registration of communicable diseases also insist on proof by bacterial examination that patients recovering from epidemic meningitis, typhoid fever, or diphtheria are free from the living germs of these diseases, before they can be released from quarantine and be considered cured. This system of supervision, after apparent recovery from infections, will without doubt be extended some day to other diseases, for there undoubtedly exist carriers of the germs of pneumonia, of the septicemias, of influenza, of rheumatism, and of poliomyelitis. But at present the germs of these diseases are either unknown or are not easily differentiated from similar germs of no special pathological significance. It is proposed to limit the following pages to a consideration of the means of applying preventive measures to the individual patient and of those measures only which are within the sphere of the general practising physician.

In connection with the discussion of the various diseases, stress will be laid on the means of prevention before the patient has been exposed to infection, the care of "contacts," and the measures which are of help after exposure and during periods of incubation, and on the onset of premonitory and initial symptoms; and finally the precautions which should be taken to protect other persons coming in contact with the affected person.

Typhoid Fever. There are three types of typhoid fever caused by related bacilli which react differently to laboratory tests. The first was isolated by Eberth in 1880. Clinically, the three fevers are one except as to severity, and the pre-

ventive treatment is identical. An attack of typhoid fever protects in a large measure from subsequent attacks and is almost completely controllable by the method of inoculation with the dead germs of the disease. This was first demonstrated on a large scale by Colonel Frederick F. Russell in the Army of the United States. Sixteen thousand inoculated men were encamped on the Mexican border in 1915 with the occurrence of but a single case of the disease and that in a teamster who had not been given the prophylactic injections. The method of immunization consists of the hypodermatic injection of a suspension of dead typhoid bacilli in sterilized water. Usually three such injections are given, at intervals of seven days, in separate doses of one half billion to one billion germs. It is usual to combine all three strains of typhoid bacilli in each course of prophylactic treatment. In the majority of cases, such treatments afford immunity for periods of from two to seven years. It is recommended that persons who are likely to be exposed to contaminated water or food be treated every two or three years. In persons who have contracted the disease notwithstanding the injections, the course of the disease is very much milder and of shorter duration. There is no known and proved method of checking the development of the infection with any preparation of the bacilli of typhoid fever when once the germs have gained a lodgement in the human body; nor is it possible to abort an attack by any known form of inoculation. Many claims to the contrary have been made in favor of the method of treatment by preventive inoculations described above, or of various modifications of it, using the suspensions of dead bacteria not only of typhoid germs, but of other germs as well. Other claims have been put forward for many kinds of chemicals lethal to the typhoid bacilli *in vitro*, to be used either by internal or by intravenous administration. Such methods have been successful only in the hands of the

original discoverers who, it is kindest to believe, were self-deceived and led astray by their urgent wish to succeed.

The methods of individual precaution which should be taken by those nursing cases of typhoid are usually considered as a part of the routine treatment of the disease. The disinfection of bed linen, the use of separate feeding utensils and towels, and the sterilization of all excreta are well described in every textbook of medicine. It is to be noted with satisfaction that since hospitals have insisted upon the inoculation of their nursing staff against typhoid, the disease has disappeared from the hospital personnel. On the other hand, one of the most important fields of preventive medicine lies in the careful investigation of all convalescents from the disease in order to be assured that the living and causative bacilli are no longer lurking in the intestinal tract and gall bladder, or are not being excreted in a virulent form in the urine and feces of these patients. It is required by the Board of Health of New York that three such consecutive examinations, made at intervals of forty-eight hours, be negative before any convalescent from typhoid fever may be discharged as cured and free from medical supervision. Such a rule can be considered only as a minimum requirement if any real safety to the community is to be secured. Typhoid fever is a self-limited disease and the bacilli usually disappear from the intestine promptly, the patient being able to resume his regular life as soon as he has recovered his usual muscular and nervous tone. Occasionally this is not the case and the individual is detained for fear that he may become a carrier. Much has been tried to hurry the normal process of disinfection. The cases in which the gall bladder is infected seem to be particularly troublesome. The internal use of intestinal antiseptic drugs, such as salol and beta-naphthol, and of drugs excreted by the liver, such as methenamine, would seem to give the best promise, although in practice

any case may prove recalcitrant to cure, in a very disturbing way. The administration of benign bacteria to overgrow and crowd out the pathogenic germs in the intestinal tract is of value in any case of chronic infection.

This method was first suggested by Escherich in 1887 and should be tried in persistent cases of typhoid carriers. The germs used are the *Bacillus acidophilus*, the *Bacillus coli*, the *Bacillus lactis aerogenes*, and the *Bacillus bulgaricus*. The use of acid-producing bacilli was suggested by Metchnikoff in 1909. The benign germs are given by mouth or by rectal injections. The long, disease-breeding career of the cook known to all sanitarians as "Typhoid Mary" is a case in point. This unfortunate woman spread typhoid from her kitchen to many victims in several localities. Prolonged medical treatment failed to cure her as a carrier. She has not been heard of as the source of a local epidemic for a number of years and is under solemn promise never to cook again.

This is an extreme example of the possible results of a typhoid infection. In her case, no history of a typical attack of typhoid fever was elicited, and yet, she carries in her intestine a strain of typhoid bacilli of great virulence. Owing to the improvement of our water supply and the control of foods as well as the widespread employment of antityphoid inoculation, the disease has become much less frequent than it was ten years ago. But it will return unless the habit of repeated inoculation is taught and practised universally.

Diphtheria is due to the specific bacillus discovered by Klebs and Loeffler in 1883 and 1884. It is largely a disease of the young because there develops a permanent immunity as the child grows older. It is not certain whether this is due to mild and unrecognized attacks, or to the frequent and successful victories on the part of the natural powers of resistance of the body against the more or less continued invasion by the germs of the disease, as is the case probably

in the acquisition of the usual immunity of adults against tuberculosis. The preventive measures against diphtheria are based on a different procedure than those used against typhoid fever. They are more definitely chemical. The discoveries of Behring and of Roux, made almost simultaneously in 1890, that the blood serum of animals, which had been inoculated either with the bacteria or with the bacterial toxins of the disease, could be used as a remedy to cure diphtheria, added a truly specific remedy to the art of medicine. More recently a method of immunization has been perfected by Park and Zingher (1915). It was found that a complete and possibly permanent immunity can be brought about by a series of three hypodermatic injections of measured doses of the toxin combined with a partially controlling dose of the antitoxin of diphtheria.

The results of these preventive measures are so sure and reliable that the Board of Health of New York has entered on a campaign to immunize every child in the city and to bring about the ambitious result of eliminating diphtheria entirely from the list of local diseases. The success or failure of this campaign will depend on the result of efforts made to educate the citizens, for there is no power to compel any family to submit the children to this comparatively harmless procedure, until such time as the children are presented for admission to the public schools. By the time that children are six years old, many have acquired their own immunity. Nevertheless, this attempt to apply the best principle of preventive medicine in a widespread experiment to some 2,000,000 children should be watched with much interest, and in itself should prove to be the greatest factor in a system of educating the lay public on a matter which is most important for the benefit of humanity. Unfortunately, there is an opposing organization of vicious propaganda against every form of medical progress which depends, however remotely,

upon animal experimentation. This propaganda has its own newspaper press, its special funds, and its systematized corps of writers and speakers who importune legislators and public officials on every occasion. This attack on the health of the nation is particularly directed against those measures which depend on vaccines and antitoxins.

Diphtheria can be quickly cured in the early stages of the disease by the injection of the antitoxic serum. This is done hypodermatically in the mildest cases coming early under treatment, and intravenously in the more severe forms of the disease, especially those in which the larynx and nasal cavities are infected. The dosage of antitoxin is measured by a system of units. This unit represents the amount necessary to immunize a guinea pig of a given weight, against a minimum dose of the toxin which would kill within four or five days. The amount necessary to abort a case of diphtheria is an initial dose of 10,000 units to be repeated at least once within twenty-four hours. Severe cases require greater amounts and more frequent administration. The after-care of cases of diphtheria, to eliminate the possibility of the patient becoming a carrier, is just as important as in a case of typhoid fever. The results of disinfecting the throat and nasopharynx are more certain than in diseases where it is necessary to change the flora of the intestinal tract. Local treatment with chemicals destructive to the Klebs-Loeffler bacilli will usually suffice. Iodine, perchloride of iron, nitrate of silver, and bichloride of mercury are among the best.

Dysentery. Following the initial work of Shiga in 1898, a number of distinct forms of bacilli have been isolated by the bacteriologists of Germany and the United States as causative factors in bacillary dysentery. In addition, an ameba has also been found as the etiological element in amebic dysentery, the endameba of Lambl (1860) and Loesch (1875). No certain method of prophylactic inoculation has been

devised, but in certain forms it is possible to shorten the disease in its early stages. This is most successful in the types discovered by Shiga and Flexner. The problem of the elimination of carriers, potential sources of fresh infection of any form of dysentery, is as difficult as in the case of typhoid fever and calls for the same detailed procedures in regard both to the individual patient and to those in nursing care. The only efficient methods of prevention are the elimination of infected foods and the control of the drinking water. The disease is endemic in the Far East and is spread by the habits of agriculture of the Chinese and their neighbors. The chief form of manure used in these countries is human excrement and travellers should be warned against eating all raw vegetables and salads and drinking unboiled water. The Chinese themselves have developed a precautionary method by their habit of drinking boiled water either alone or as tea. There is a distinct need for improved sanitation throughout the world in regard to the disinfection of sewage and the prevention of the pollution of rivers and streams, now so common in civilized countries, both by manufacturing plants and by the drainage of small and large towns.

Meningitis may be a secondary disease resulting from an extension of some local infection of the sinuses or tissues near the base of the skull; or it may result from some general septic or tuberculous infection. It can be caused by the pneumococcus or the germs of influenza or of typhoid fever, and by the *Bacillus coli*. In addition, there is the general epidemic, cerebrospinal meningitis, due to a specific germ, the *Micrococcus intracellularis* of Marchiafava and Celli (1884), which was completely identified by Weichselbaum in 1887. The mode of entry of the germ is, in the majority of cases, through the nasal cavity. Its prevention consists of caring for every evidence of infection of the nose and throat, however slight, particularly whenever there is an epidemic of the disease in

a community. The mortality of the disease can be greatly reduced by the early use of the serum containing the specific antitoxin. Success in aborting the disease is proportionate to an early diagnosis by a spinal puncture and the prompt administration of the serum by intraspinal and intravenous injections. The serum is a preparation of the blood of inoculated horses and is quite similar in its nature and in its mode of application to the serum used in diphtheria. The original discovery by Jochmann in 1906 was improved and put on a basis of practical application on a large scale by the work of Flexner in 1908.

Anterior Poliomyelitis. Infantile paralysis is caused by a filterable virus which invades the body probably through the nasal tract. The preventive treatment consists of the same procedures as in the case of epidemic meningitis. There is no specific serum of animal origin, in the same sense, as for diphtheria and meningitis. The early diagnosis by spinal puncture and the intraspinal or intravenous injections of human serum secured from convalescent patients have proved of great value in the abortion of the disease and prevention of the paralytic symptoms. An acquired immunity is gained by many children through a mild attack of disease which runs its course without paralysis. The absence of cases of the disease during an epidemic is noted in the experience of such communities as institutional homes for children which are isolated from the surrounding population, but instances of direct contagion from those ill have rarely been proved. The isolation of the well rather than of the sick seems to be the effective method of securing the desired end.

Scarlet Fever. A new antitoxin serum has been developed by Dochez (1926) working with the specific streptococcus discovered by him, and the immunization of children may well be an accomplished fact in the near future. (Cf. chapter on Pediatrics.)

Measles. A similar result is now accomplished by the use of human serum from patients convalescing from measles. Both these latter diseases begin with eruptions in the throat, and the severe complications of otitis media and mastoiditis are less frequent now in the children who have been previously operated on for the removal of pharyngeal adenoids and diseased tonsils. The exposure to these two diseases can often be definitely fixed, and it is not impossible in the case of measles, to remove the diseased lymphatic tissue from children so exposed during the eleven-day period of incubation. This can be done with advantage to the child if prompt action be taken.

Greater detail in regard to these three diseases, scarlet fever, measles, and infantile paralysis, will be found in the chapter on Pediatrics.

Influenza. This disease was reintroduced to the medical world, after a long period of quiescence, in 1889 and soon thereafter (1892) Pfeiffer announced his discovery of the influenza bacillus. The production of effective preventive measures has not followed his discovery, and even the specificity of this germ has been doubted and denied. In spite of the non-existence of a specific serum and the failure of inoculation with dead germs to influence the incidence or course of influenza, preventive measures are most important. The disease is highly contagious and the mildest attacks of the typical fever of three days' duration may be followed by a profound neurasthenia or by inflammation of the respiratory and renal organs or of the nervous system, and even by meningitis. The germ of influenza has the power to destroy, temporarily at least, the normal resistance of the body. Its possible sequelae include any infection, local or general, to which man is heir. The spread of the infection can be controlled only by prompt isolation or local quarantine of those ill of the disease. The prevention of the sequelae can be accomplished in part, by the insistence

of treatment in bed, even in what appears to be the mildest cases. The complicating pneumonia of influenza became a world-wide epidemic during 1918–1919. This disease spread from the unhygienic environment of the large armies which were carrying on the World War and proved to be a very fatal scourge over which preventive and curative medicine had little influence. Cases of influenzal pneumonia are still appearing sporadically, but the epidemic wore itself out after travelling around the globe. The much advertised vaccines have little or no power to prevent or cure influenza.

Pneumonia. Considered as an infection, pneumonia is not one disease, but may be caused by a very great number of different germs. The most specific of all is the pneumococcus discovered by Fraenkel and Weichselbaum working independently in 1886, and of this there are many varieties. It is usual to classify the pneumococcus in four groups, of which the first three are different varieties, while Group IV contains all the other pneumococci, some recognizable and some unknown. Pneumonia, clinically, is a local inflammation of the lung. It occurs with a large number of other diseases, including such widely varying infections as bubonic plague, typhoid fever, measles, diphtheria, and influenza. In addition to the germs of these diseases and the pneumococci, pneumonia is also, but infrequently, caused by the bacillus of Friedlander (1886) and frequently by many types of streptococcus and the many germs of septicemia. To apply the methods of preventive medicine to this hydra-headed antagonist is no simple problem. In general, it is impossible to inoculate any individual with the dead germs of every variety which has any possible etiological relationship to pneumonia. As a matter of fact, it is extremely doubtful if the prophylactic inoculation with any of the causative germs of pneumonia has any

real value whatever. A large number of such injections are given every year and the enthusiastic protagonists for the procedure are apt to give credit to this injection for every case which does not develop pneumonia, and to forget or belittle the lack of result in those cases in which protection does not follow. It can be confidently asserted that such inoculations have as yet resulted in no very great reduction of the incidence of pneumonia, for those previously inoculated are by no means immune, as is the case with typhoid. The existence of so many causative factors in pneumonia forbids any such expectation. Although the general profession has discarded the original conclusions and methods of Sir Almroth Wright (1903) in regard to the value of the opsonic index in the use of inoculations of dead bacteria as a curative agent, no one can fail to agree with his clinical observation that these injections frequently cause an exacerbation of symptoms. Whether or not this is caused by the "negative phase" of Wright is immaterial. The present emphasis must be put on the possibility that in certain cases and with certain germs these inoculations may result in an increased susceptibility to the germ already present in the blood and to a lowered resistance to the existing infection, and not to the creation of any immunity at all. In regard to pneumonia, it is safe to say that no preventive inoculation has been discovered.

The story is more encouraging when one considers the use of antitoxic serum. A very efficient serum against the pneumococcus of Group I exists as the result of the work of Dochez and Avery (1912). The pneumococci of Group II and Group III are much more virulent, but sera of some degree of potency already exist for those groups also and their production is being steadily improved. The use of these intravenous injections depends for success on the earliest possible diagnosis of the type of the disease, which

is made by bacterial examination of the sputum and the blood. Uncomplicated pneumonia is a self-limited disease of not more than ten days' average duration and these sera should be administered, if at all, during the first three days. The ideal effect will be the complete control of the infection within thirty-six hours. The use of the serum later in the disease is not recommended except in the presence of an extension of the inflammatory process to new areas of the lungs, or when indicated by a positive blood culture. The causative pneumococcus, in any case, loses its virulence rapidly as the patient convalesces, and active disinfection of the upper air passages is of little importance. Pneumonia is not a highly contagious disease and individual precautions for the disinfection of the sputum usually suffice to protect the nursing staff. In cases of pneumonia due to germs other than the pneumococcus no preventive measures by antitoxic sera exist.

Smallpox. Variola is entirely controllable by vaccination with the virus of the disease which has been modified by the inoculation of young cattle. The nature of the virus has not been discovered, but the identity of the virus of human smallpox and that of cowpox has been established. A primary vaccination gives a permanent immunity which, however, usually loses its full potency as years go by. Complete immunity is usually estimated as lasting from six to seven years. Vaccination was introduced by Jenner (1798) and against opposition, both from laymen and from his colleagues, it slowly replaced the protective inoculation with the virulent virus of smallpox which was previously much practised. It is customary to revaccinate any person who may be exposed to smallpox, for it is found that the course of the variola can be distinctly ameliorated if the vaccine with its incubation of five days be allowed to influence the resistance of the patient to smallpox during the longer period of incubation

of fourteen days. The same problem of administration of public health exists in the case of smallpox as in that of diphtheria. No power exists in most communities to compel universal vaccination. In some of our States compulsory vaccination prior to admission to the Public Schools is the nearest approach to an ideal condition. In California, even this precaution is not enforceable by law and the records of that State show a marked increase in the annual incidence of the disease. The fact that 25,000 cases of smallpox occur each year in the United States is a disgrace to our civilization. The propaganda which helps to make this possible can be overcome only by a careful and systematic education of the whole population. When cases of smallpox occur, a complete quarantine is necessary to protect the community, for the disease is highly contagious. It is treated in special hospitals.

Rabies. One of the later triumphs of Pasteur was the successful application to rabies of the principle which furnishes the vaccine against smallpox. This is the subcutaneous injection of the real virus of a disease which has been modified and attenuated by its passage through another animal. In smallpox the virus is attenuated by inoculation of the *cow*, and hence the name *vaccine*. In rabies, the protective virus is made from the spinal cords of rabbits which have been inoculated with the virus of the *mad dog* and which have then been attenuated by drying. The treatment for hydrophobia is never given until after the patient has been bitten or exposed to the disease. The virus can enter the body only through a wound, but the saliva of the rabid dog can infect through the merest scratch. The wound should be cauterized with nitric acid. The period of incubation is long, unless the patient has been severely bitten about the face and neck; the diagnosis can be made very quickly in a pathological laboratory by the examination of the brain of the dead animal. The successful prevention of the disease should follow imme-

diately after the proper examination of the brain has proved that the dog, cat, or other animal was really sick with rabies. The treatment formerly consisted of daily injections for twenty-one to twenty-eight days with the attenuated virus in doses of increasing strengths, but this period has recently been shortened.

Yellow Fever. This disease has practically disappeared from the Western Hemisphere, due to the work of Reed, Carroll, Lazear, Agramonte, and Gorgas. Even Guayaquil has ceased to be a world menace. This has been done by the intensive campaign of the Rockefeller International Health Board against the *Stegomyia fasciata* mosquito, the bite of an infected insect of this species being the sole source of infection. A spirillum was isolated from cases of the disease by Noguchi in 1920, but this menace of the tropics has been conquered by an attack on the intermediate host of the pathogenic organism and not by treatment, either prophylactic or abortive, of the patient. The disease is still endemic in parts of equatorial Africa, but is under attack by the International Health Board at the present time.

Malaria. A specific cure for malaria exists in the drug cinchona and its alkaloid quinine, which was introduced into Europe in 1640. In recent infections a rapid cure is easily possible by a thorough cinchonization of the patient. Malaria is due to the introduction into the blood of the causative protozoan or plasmodium by the bite of the Anopheles mosquito. Prevention of the disease can be secured, for persons living in malarial countries for short periods, by the taking of a daily dose of some 5 to 10 grains of quinine. Untreated malarial infection produces a cachectic anemia which is well-nigh incurable. The extirpation of the mosquito in any district is the only certain preventive and will eliminate the disease quickly and entirely. This result is accomplished only after continuous control, by drainage of swamps, by breeding of minnows in stagnant pools of water, or by cover-

ing the water with petroleum and thus causing the death of the larvae by cutting off their oxygen supply at the surface of the water. This has been done on a large scale in the Italian Campagna and in other tropical and semitropical countries. By the total destruction of mosquitoes, malaria and yellow fever have been entirely eliminated in districts which have long been infested with both diseases. It was an extensive campaign of this kind at Panama, carried on by Gorgas, which made possible the construction of the interoceanic canal.

Anthrax, Glanders, Cholera, and Plague. All of these diseases formerly caused epidemics but are rarely seen today except in sporadic cases or in local epidemics. Anthrax is interesting because the inoculation by Pasteur with small doses of the living bacilli, attenuated by prolonged culture at comparatively high temperature, was his first success against any disease, and in this instance, one which had become a serious menace to the flocks of sheep in agricultural France (1881). The infection of man rarely occurs, and when it does is usually due to the handling of infected hides or furs. The diagnosis by bacterial examination of the secretion from the local "malignant pustule" indicates the means for a rapid cure by surgical intervention. There is no truly specific antitoxin which acts as a curative or preventive remedy.

Glanders is due to the *Bacillus mallei* which was discovered in 1882 by Loeffler and Schütz. It is usually transmitted to man from infected horses. It is a rare disease and is not influenced by inoculation with attenuated cultures, or with the dead bacilli, or by injections of mallein, the specific toxin of the disease.

Cholera results from a gastro-enteric infection with the specific spirillum of Koch (1886) through the medium of infected drinking water. The preventive treatment is the same as for other water-borne diseases, such as typhoid and

dysentery, without the aid of protective sera or inoculations. The disinfection of the excreta and the protection of the nursing staff are most important factors in the control of the epidemic character of Asiatic cholera.

Bubonic plague is transmitted by the bite of fleas infected from rodents or human patients sick of the disease. But the plague is a more complicated question because there is a pulmonic type which is very fatal, highly infectious through the respiratory tract, and which presents an entirely different syndrome than does the bubonic case. A further menace of this bacillus, discovered independently by Kitasato and Yersin (1893), is found in the infection of rodents by the disease. When an epidemic occurs it can be controlled only by an intensive slaughter of the rats and squirrels which will be found infected and which are the immediate hosts for the transmission of the disease by the bite of the flea. There is much to be said for the curative serum of Yersin and for inoculation with dead bacteria as advised by Haffkine and Gaffky as a preventive in both the bubonic and pneumonic types.

Septicemia. Every blood infection is a septicemia and positive blood cultures are the rule in typhoid fever, in the severe pneumonias, and in many other diseases. A positive culture of streptococcus has been found even in so simple an infection as an acute tonsillitis of three days' duration. The term is applied here to the general infections which are caused by the streptococci, the staphylococci, and the other bacteria which are the factors in the infection of wounds. The mode of entry for these general infections is from wounds or through the nose, the mouth, and the neighboring glands and sinuses. The acute blood infections follow a neglected focal inflammation or begin as a fulminating invasion of the body by a type of germ of unusual virulence. Many attempts have been made to produce a protecting and curative serum

and the use of suspensions of dead bacilli has been very widespread, but the results in the acute cases have been discouraging. A true immunity does not exist and prevention will be limited to increasing the resistance of the body. In the chronic cases a great deal has been accomplished by the control of focal infections and the prevention of the progress of the infection. Inoculations of the dead bacteria in these cases seem to help, whether the germ used be autogenous and secured from the patient himself, or secured from other cases of the same disease. A similar improvement of the resistance to bacterial infection can be secured from the shock reactions of foreign proteins which have no possible relation to the life history of the causative germs themselves. It is always difficult, in this form of medication, to distinguish between this reaction from foreign proteins and a true specificity of the dead bacteria themselves, even when of autogenous origin. Many newly discovered antiseptics, especially those which are synthetic dyes, have been employed for the same purpose intravenously, as direct chemical germicides in the blood, but without any very satisfactory results. In the acute infections, the use of transfusion of blood has proved of some benefit. The successes of modern surgery and obstetrics depend entirely on methods of asepsis. Pasteur was the discoverer of this general group of germs (1879) in cases of puerperal fever and septic infections. Recent investigations have shown that the streptococcus is a generic name for many types which can be distinguished only by their effects in causing different clinical symptoms and not by the ordinary methods of the laboratory. Whether the new methods introduced by Dochez in his discovery of a curative serum against the streptococcus of scarlet fever and that of erysipelas will yield more reliable results in the further investigation of other groups of streptococcus remains for the future to determine. Bodily cleanliness and

the prompt disinfection of recent wounds are prophylactic measures of obvious value.

Erysipelas is a wound infection by a specific streptococcus discovered by Fehleisen (1883) for which a serum of decided value has recently been produced. Erysipelas is no longer a menace to surgery but exists as a spontaneous disease arising from infections through minute lesions of the skin, especially about the face and scalp. It is one of the diseases which seem to be partially aborted and their course shortened by subcutaneous injections of the extract of the leucocytes of the rabbit, a treatment devised by Hiss in 1908. The contagiousness of erysipelas is easily controlled by the ordinary methods of individual precautions. It is no longer the scourge of surgery that it was before the work of Lister.

Tetanus. It is fortunate that the period of incubation of lockjaw is a long one and that the preventive serum has a very positive opportunity to immunize the patient after infection has taken place. Tetanus is almost always the result of accidental wounds, especially of punctured wounds. It is endemic in certain localities only. Its treatment is eminently preventive, for fully developed cases only rarely recover, even when the specific serum is given in large doses. It is infectious only through an open wound, the surgical treatment and removal of the foreign bodies from the infected wound being essential to a cure. The tetanus germ can become one of the regular elements in the intestinal flora of an individual. This is especially true of persons living in tropical countries such as Mexico. Deaths from tetanus have resulted from operations on the intestine of these carriers. Although such cases are extremely rare, a single death from lockjaw after a surgical procedure is sufficient to cause much thought and to suggest the preoperative use of antitetanus serum in abdominal operations upon persons living in localities where lockjaw is endemic.

Rheumatic Fever. That rheumatism is caused by a streptococcus has been claimed by more than one observer. It still remains, however, an unsolved problem in etiology. The infection takes place through the tonsils in a large majority of cases, but also through the pharynx, nasopharynx, and adjacent sinuses. The infection may begin as a local inflammation, such as typical follicular tonsillitis, or it may become a general articular rheumatism with very little local disease in the throat. No serum, either preventive or curative, has been produced as yet by the many investigators who have studied this disease. Prevention lies in controlling the port of entry of the causative germ and consists in removing the tonsils and other adenoid tissue from the throat as early in life as those glandular organs show any signs of chronic inflammation or any tendency to acute attacks of infection. The questions relating to the abortion of an attack, the control of direct contagion and the prevention of convalescents becoming chronic carriers, are not essential points in any consideration of rheumatic fever. Nor is the prevention of a very painful and depleting disease, which cripples the sufferer for comparatively long periods, nearly so important as is the exclusion of the complications and sequelae. The inflammatory process may not be limited to the joints, but may involve the pleura, the meninges, the peritoneum, and, more often, the endocardium and the pericardium. The insidious nature of rheumatism is seen in the disease in children, for in the young patient, the inflammation of the joints is either absent or so slight as to be termed "growing pains" by family observers, and endocarditis is the common later manifestation of these infections. Most cases of valvular heart disease begin in childhood and in many instances the results are so slight for months or even years that they are not recognized until a really severe valvular lesion is found by a physician examining a child, supposed

by its family to be healthy. Early tonsillectomy, in all cases showing any symptoms of disease, such as hypertrophy of the tonsils, or enlarged lymphatic glands in the neck, or frequent attacks of "colds" in the throat, or of unexplained and short fevers, should be seriously considered, and in most cases, performed. This procedure will be a large element in controlling the increasing incidence of heart disease among the nations of civilization.

Arthritis. Izaak Walton, writing at the age of sixty, in his disquisition on the contentment which should be the lot of the "compleat Angler," congratulates his scholar and enjoins him to rejoice: "That our present happiness may appear to be the greater and we the more thankful for it, I beg you to consider with me how many do even at this very time, lie under the torment of the stone, the gout, and the toothache." This grouping of three of the cardinal characteristics of the chronic inflammation of the joints by old Izaak in the year 1653, is at least noteworthy of his powers of observation. He has grouped together three interesting symptoms, the "stone" in the bladder, noting the existence of a uric acid diathesis, the "gout" which is still today the popular name for an arthritis, and the "toothache" of infected gums, which has been definitely recognized as one of the chief sources of the chronic infections of the joints only during the past twenty years. Arthritis is caused by a slow poisoning by many bacteria which invade the general system from some focus of infection. The primary infection may be in and about the mouth and nose, especially at the root sockets of devitalized but painless teeth; it may be in the colon, or in the gall bladder, or in the pelvic organs of either sex. The infecting germs are usually to be found among those causing septic inflammation. Many of the strains of streptococci, the typhoid bacillus, the gonococcus, the pneumococcus, the specific germ of syphilis, and other less usual forms of

microorganisms have proved to be possible causes. Other arthritides are possibly not infectious at all but due to errors of metabolism; such are gout and some of the arthropathies. The prevention of arthritis lies in the early cure of any focal infection which may give rise to a subsequent arthritis. The early abortion of a case already begun is possible by the same lines of treatment that must be continued as a curative measure. Such methods of treatment include the removal and cure of all focal infections, especially of the teeth and gums, and the reestablishment of the normal flora of the colon. The colon must be disinfected in every case, for the continuous threat of reinfection exists in a colon long after the original focus of infection has been eliminated and cured. There is no infection that is more amenable than arthritis to the use of subcutaneous and intravenous injections of dead bacteria and other foreign proteins. The casein of milk, the dead typhoid bacilli, the serum of the horse or goat, whether containing diphtheria antitoxin or not, will have a beneficial effect upon cases of arthritis due to entirely different germs. The use of autogenous bacteria for such injections is recommended, especially by those who believe in the desirability of getting a specific effect. The specificity of the germ to be used can be tested by the intradermal injection of the dead bacteria after the manner devised by Schick and recommended by Thomas, or by making tests for fixation of complement with the patient's blood serum discovered by Wassermann. Every case demands an individual study to find a specific bacterial cause if possible, in order that a specific remedy of bacterial origin may be applied. Most cases will have to be controlled on every phase of hygienic living which, however, does not come within the scope of this present article.

Syphilis. Although syphilis has been appropriated by the specialists on dermatology and venereal diseases as in their

peculiar domain, it has a very important significance for every practitioner of medicine. It is by no means exclusively a venereal disease in its mode of infection and it has a distinct importance because, although its period of contagiousness can be limited by appropriate treatment to a comparatively few months, the possibility of its transmission by inheritance from either parent remains much longer, and the probability of late degenerative changes in the cardiovascular and nervous systems can never be entirely eliminated so far as the infected individual is concerned. A careful analysis of the admissions to a general hospital which has no special department for syphilitic patients shows that about 14 per cent of the general population give a positive Wassermann reaction, which is characteristic of this disease. A more detailed discussion of this problem is given in a later chapter, but it is important to note here that syphilis was the battle-ground of the most ambitious attempt to overcome a serious infection by a single, short, and overwhelming dose of a specific chemical. This conception came from the brilliant mind of Ehrlich. Ehrlich's attempt was a failure, but he added arsenical mixtures for intravenous use to our pharmacopeia, and these have extended in many ways our power of attack over this disease and have been of the greatest value.

There are a number of infectious diseases which are unusual and seldom seen in the temperate zone, in certain of which the causative germs and the method of infection are known, but unknown in others. They do not present any new problems in addition to those already enumerated in the above discussion of similar diseases. In none of them is there a specific preventive measure and the general avoidance of infection is the only measure now known. Among these diseases, the following may be mentioned:

Typhus Fever, or jail fever, is endemic in Russia, Mexico, and countries where the intermediate host, the body louse,

is not kept under control. It is associated with the Rickettsia bodies in the blood which are now considered the cause of the disease. The prevention of typhus consists of the destruction of the human parasite (*Pediculus vestimenti*) which transmits it. It is known in a severe form in the Western United States as Rocky Mountain fever, and a mild form in New York City has been called Brill's disease.

Relapsing Fever is also a disease of unhygienic and filthy surroundings. It is caused by the spirillum of Obermeier, discovered in 1873. The method of infection is not determined, though the bedbug is believed by some observers to be the carrier of the germ from the sick to the well.

Malta Fever is caused by a known micrococcus discovered by Bruce in 1887 and is transmitted through the drinking of goat's milk or eating cheese made therefrom. It may infect cows and horses also and cases have occurred in this country through the drinking of milk from cows infected with the *Bacillus abortus* of Bang. There is no preventive medical treatment.

Yaws or Frambesia is a tropical disease due to a spirillum similar to that causing syphilis, which disease it simulates closely. It is quite rapidly cured by salvarsan.

Weil's Disease is due to the transmission of a spirillum by the bite of a flea infected from rats. No prophylactic treatment has as yet been discovered.

Dengue is a mosquito-borne disease due to an unknown germ and without known specific or preventive treatment.

Trypanosomiasis. African sleeping sickness is a disease resulting from the bite of the Tsetse fly and is caused by the presence of a specific trypanosome in the blood. There has been a rumor as to the discovery of a new chemical remedy but this has not yet been published to the world. Various other diseases in Africa and Tropical America are caused by other trypanosome species.

Leprosy is a chronic infection with a known bacillus discovered by Hansen in 1879. It is directly contagious through abrasions of the skin. There is no known or curative measure connected with the growth or biological relations of its bacillus. Very recent experiments, however, by those working with Chaulmoogra oil seem to offer the hope of a cure in cases of early infection.

Infections by Yeasts and Moulds. Septicemias due to moulds such as trichomycetes (for example, actinomyces, first described by Bollinger in 1877) have been reported in human beings. These cases of general infection are usually fatal but yield to surgical treatment when the infection is a local one. Intestinal infections due to yeasts and kindred unicellular organisms take on, in their severest forms, the appearance of a general disease. They are amenable to dietetic treatment if the resulting cachexia and anemia have not progressed too far. The tropical diseases known as sprue and pellagra are classified by Ashforth in this group, though the influence of a monotonous diet is also a causative factor. The addition of fresh fruits, especially strawberry juice and the juice of citrus fruits, and of mineral acids is both curative and preventive, the anemia being largely controlled by the same diet of liver extract as is efficient in pernicious anemia.

Cardiovascular Diseases. Chronic heart disease is today one of the greatest problems in preventive medicine. The inflammation of the lining and of the external coverings of the heart may result from some of the infectious fevers. Valvular disease is most common as a complication of rheumatic fever, influenza, pneumonia, and scarlet fever. As the original disease subsides, the heart is apt not to get well but be left with a damaged valve or muscle. The heart may, however, recover entirely or, recovering from the inflammatory process, it may be left with a thickened valve or a narrowed valvular orifice. The arterial system is also the site

of a chronic inflammation, especially in syphilis. There then ensues a thickening and hardening of the arterial wall which will persist through life. The recent work of Pappenheimer and von Glahn, extending the researches of Aschoff on the rheumatic heart, has shown that the typical rheumatic changes in the connective tissue of the heart are also found in the aorta and in the whole arterial system down to the smallest vessels. This discovery places rheumatic fever on a par with syphilis as a cause of arterial disease. There is again another but lesser factor in the causation of degenerative changes in the heart muscle which is the occurrence of embolic accidents in the internal circulation of the heart itself. In general, the inflammatory valvular diseases of the heart involve either the mitral valve, when they are of rheumatic origin and date back to childhood; or are situated at the aortic valve, date from early adult life, and are probably luetic in origin. This classification has but little to do with the treatment of the heart and circulation, but much to do with the prevention of progress of the lesion by the adoption of the antiluetic measures in the one case, and of antirheumatic treatment in the other. Such a course of treatment, however, must not be begun on the decision of the location of the diseased valves, but only after one or the other causative factor has been definitely ascertained. The existence of active endocarditis demands active treatment of the proven cause, but great care must be taken before advising the prophylactic tonsillectomy, which is ordinarily indicated in rheumatic cases. Tonsillectomy, during the course of an active endocarditis, may occasion a sudden overwhelming invasion of the general circulation by the streptococci locked in the tonsils. Such a result may be very serious. The prevention of the development of serious lesions of the cardiac valves depends on the early recognition of the beginnings of such an infection, and on the continuing of enforced rest

and careful diet during the period of activity of the endocarditis. This period cannot be determined beforehand, for there is no general rule which is applicable. Those patients are usually young and often difficult to control, and only frequent and careful physical examinations, especially at the time when the patient is first allowed to get out of bed and about, can determine the question. The duration of this period of convalescence has no relation whatsoever to the severity or mildness, or to the duration, of the original infection from which the endocarditis arose.

The very severe and universally fatal cases of acute bacterial infection of the endocardium are usually the result of a secondary infection upon an old valvular lesion by some of the pyogenic cocci. This frequently begins as a sequel to a focal infection about the mouth, nose, ears, nasopharynx, or the accessory sinuses, but any infection may be the starting point. The early cure of these septic foci is the only preventive, for after the heart valves have become infected, little can be done. Every known procedure of antiseptic value has been tried—transfusions of blood, the intravenous use of chemicals including mercurials, arsenicals, and aniline dyes, and inoculations with dead bacteria—but all have proved useless. The early cure of any local foci of infection is important for every patient, but is an absolute necessity for those suffering from a chronic lesion of the heart valves and endocardium. The influence of the syphilitic poison on this condition has long been appreciated and the additional knowledge of rheumatic fever as a further cause is a step in advance to help eliminate the commonly used term "essential" blood pressure. "Essential," in this connection, is a misnomer used to camouflage our ignorance of the etiology of arterial sclerosis and is akin to the older term "idiopathic," formerly applied to pleurisies now known to be tuberculous. The fact that high blood pressure can be of rheumatic origin

adds a new and strong incentive to emphasize the anti-rheumatic therapeutics which can prevent and cut short the influence of any rheumatic poisoning as soon as, and as long as, it manifests itself.

Angina Pectoris is the name of a single symptom, pain in the chest, which is characteristic of arteriosclerosis of the coronary arteries. This symptom so over shadows the remaining ones caused by the muscular degenerations that it has come to signify in the minds of the laity and of many practitioners a distinct disease. The weakness of the heart muscle due to myocarditis is the real menace of the pathological condition and may give rise to severe symptoms of failing circulation without any pain or angina at all. The prevention of these deaths from disease of the cardiac muscle lies in the treatment of the causes of arterial degeneration, that is, in the treatment of syphilis and rheumatic fever in the early stages of both infections.

Aneurysm. The same statement and the same precautions apply to the preventive treatment of aneurysm. More particularly does this condition presuppose a luetic infection. Aneurysm may occur in any artery but it is preeminently a disease of the aorta. In both conditions, aneurysm and myocarditis, when once established, a prolongation of life and the continuance of a comfortable life depend on an even, methodical routine without over-exertion, exempt from either prolonged or sudden effort, and a careful diet without stimulation by tobacco, coffee or tea, or by alcoholic beverages, which latter, however, are useful in the treatment of the attacks.

Nephritis. The diseases of the kidney, which are grouped in the mind of the layman as Bright's disease, are made worse and prolonged by the same changes which cause arteriosclerosis. The origin of nephritis is to be found n any extra and too severe a demand for the kidneys to eliminate the

chemical poisons or the living bacteria which are characteristic of the infectious diseases. Scarlet fever, typhoid fever, influenza, the pneumonias, diphtheria, and the septicemias are prominent causes of nephritis. The control of these infectious diseases will have a marked effect on the control of nephritic conditions. No specific preventive measures exist, for nephritis is practically always a secondary disease. Careful living and careful dieting form the chief reliance of preventive medicine to control the progress of the disease after it has started. Overeating of any kind of food, especially of protein foods, adds an extra amount of work for the kidneys to do, and is harmful in direct relation to the excess amount ingested. Excess in the use of alcoholic beverages consists in taking any amount greater than can be oxidized and utilized as a food by the body tissues. Such an excess is a direct irritant to the kidneys and will act to increase the degenerative processes which are characteristic of all forms of nephritis.

Diseases of the Respiratory Tract. Inflammations of the mucous membrane of the larynx, trachea and, bronchi are symptomatic of many infectious diseases; they are especially an early characteristic of influenza, typhoid fever, measles, and pneumonia. Attacks of simple uncomplicating bronchitis and laryngitis should be treated promptly and their control will prevent the development of many cases of bronchopneumonia and the severer types of bronchitis.

Asthma is due to a spasm of the muscular walls of the smaller bronchi and presents the symptom-complex of expiratory dyspnea, dry cough, pain, and cyanosis. It may be due to a bacterial infection and therefore associated with bronchitis; in such cases the attacks are controlled by the use of injections of the dead specific bacteria. Or it may be due to exposure to some foreign protein acting as a toxin after inhalation or ingestion into the intestinal tract. In these latter cases the attacks may be controlled by inocula-

tions with increasing doses of the causative protein. The offending protein may come from the pollen of plants and grasses, from the feathers of birds, or from the hair of horses, dogs, or other animals, or from many kinds of foods. The specificity of these proteins is determinable by intradermal injections in accordance with the methods now in common use, which were formulated first by von Pirquet and Schick.

Diseases of the Digestive Tract. Indigestion is a diagnosis that covers a multitude of errors. Epigastric pain, nausea and vomiting, with or without fever, form a syndrome which may be due to cardiac conditions akin to angina pectoris, to crises from the chronic sclerosis of the spinal cord such as locomotor ataxia, as well as to local conditions of the gastroenteric tract itself, and which may be diagnosed as indigestion. Every attack of epigastric pain, even if slight, deserves a careful study. It is an old maxim that disturbances of the stomach indicate cardiac disease, and irregularities of cardiac rhythm are caused by errors of gastric digestion. These cases of gastric indigestion may be divided into those associated with low acidity and those of hyperacidity. The treatment, though only symptomatic, with drugs and supervised diet will often prove preventive of severer inflammation leading to ulceration in stomach and bowels. The correction of ulcerative changes, especially in the stomach, by courses of medical treatment or even by surgical operation may tend to prevent the incidence of a cancerous formation. The development of cholecystitis and gallstones will be favored by the neglect of the early symptoms of gastroenteric pathology. All the risks of surgery of the gall bladder, due to an existing jaundice, will be reduced by an early diagnosis and prompt operation. There is no medical treatment for the removal of gallstones when they are once formed. The prevention of a chronic colitis consists in careful dieting and proper local treatment in the early and acute stages of the disease. There

is no group of pathological conditions more neglected by the laity than the acute attacks of gastroenteric disease.

Acute Yellow Atrophy of the Liver is a rare and generally fatal disease due to an overpowering of the liver tissue by bacterial or chemical poisons. Arsenic, used to excess, and some of the poisoned liquors of the unscrupulous or ignorant bootlegger have caused a recent increase of this condition in the United States.

Parasitic Diseases. These of the skin may invade the mucous membranes of the mouth, but rarely do they act as the cause of general infections. The parasites of the body are found in the intestines and are introduced with food and drinking water. The trichina comes from the larval worm forming the "measle" in diseased pork. This worm penetrates the intestinal mucosa and is in turn deposited in the muscles of the human host. The filaria also becomes generally distributed in the embryonic form as a parasite of the blood serum. These two are exceptional examples of parasitic worms and in neither case are there prophylactic measures available other than preventing the original ingestion of the worm from infected meat and water. One of the most prevalent of tropical worms is the hookworm or uncinaria. The hosts of these worms are very numerous in the tropics. Persons so infected become subject to a cachexia and anemia and are incapacitated from doing work in consequence. One of the greatest successes of mass prevention of disease has been carried on in the world-wide attack on hookworm infection by the International Health Board. Large districts have been cleared of this menace to industrial efficiency by the prevention of reinfection and the cure of those infected. The work has been a model of the application of preventive medical methods on a large scale.

The Metabolic Diseases. In this group, there are included those errors of nutrition which depend on some disorder of

the internal chemistry of the body, and some other diseases, seemingly allied to them, but of unknown nature.

Diabetes is a chronic error of nutrition in which the cells of the body lose their power to oxidize, primarily the glucose, and secondarily the fat in the blood. Although the exact chemistry of diabetes is not known, this condition is due to an absence or diminution in the blood of the internal secretion known as insulin, which is formed by the cells in the islands of Langerhans of the pancreas. Diabetes usually begins slowly and its recognition is possible in the early stages of its development. Much can be done at this early period to prevent the continuation of the error in metabolism by careful dieting. In acute cases and in those fully developed, the use of insulin by hypodermatic injection will control the condition for many months and years. Such cured patients, however, must be under continued observation and, occasionally, must continue the insulin indefinitely. In spite of the discovery of insulin by Banting in 1922, and of its very general use in the treatment of this disease, the incidence and mortality ratios to population from diabetes have not only not decreased, but have actually increased. This seems to be due to the increased amount of carbohydrate which is now consumed in the United States since the adoption of the prohibition laws. It emphasizes the necessity of reducing the amount of sugars and starches in the diet of all persons known to be subject to diabetic disease.

Graves' Disease, or exophthalmic goiter, is due to a disturbance of the internal secretions of the thyroid gland. The exact error of internal chemistry cannot be formulated, but its causation and the exacerbations of its symptoms are influenced by sudden depressing and emotional shocks of fright or grief. Prevention of this disease consists in the protection of the patient with a tendency to hyperthyroidism from fatigue, from nervous irritations, and from similar strains. The cure and prevention of relapses is in large part a

question of the surgical removal of a portion of the overacting gland, to be followed by a convalescence under regulated diet, careful exercise, and a simple mode of life.

Myxedema. The reduction of the normal amount of thyroid hormone causes a condition of swelling of the skin, of the accumulation of fat, of an anemia, and of a hebetude of mind. The prevention of the condition consists in giving these patients a proper amount of the thyroid gland of animals. The treatment requires much supervision to bring about a control of the error in metabolism and at the same time to prevent the development of a hyperthyroidism from overdosage with the gland.

Gout is a congenital error relating to the catabolism of proteins, with a resulting excess of uric acid constantly dissolved in the blood serum and deposited in the body tissue. The increased formation of uric acid is associated with a lessened secretion of the purin bases by the kidneys. The preventive treatment lies in the control of the intake of food which forms uric acid and in the increased excretion of uric acid when formed. Once the disease is established, it cannot be completely cured, but a fair measure of control is possible for many years.

Hemorrhagic Diseases. The group of disease conditions characterized by the symptom of ecchymosis in the skin and mucous membranes and by bleeding from the organs of excretion are by no means of one character. The effect of the transfusion of blood on these conditions is to check this symptom temporarily in most cases, permanently in others. The milder cases of infective purpura of Schönlein are benefited, but the severer froms, as described by Werlhoff, not at all. The congenital hemophilia can often be controlled, even for long periods.

Scurvy. In scurvy, which is due to a deficiency of vitamins, the cure, like the prevention, is found in a diet of fresh

fruits and nonsterilized milk; the latter is particularly useful in the case of infants.

Addison's disease, Hodgkin's disease, the leucemias, Raynaud's disease, and acromegaly have not as yet come within the province of truly preventive medicine.

Rickets is preventable by a proper diet containing vitamins and by exposure to sunlight. This condition is more fully described in the chapter on pediatrics.

Pernicious Anemia. The recent discovery of Minot and Murphy proves that pernicious anemia is prevented and controlled by the addition of comparatively large quantities of liver to the daily diet. About 1 pound a day seems sufficient for the ordinary case. An extract of liver tissue has been prepared and is found to have the specific effect of the whole liver in controlling this form of anemia. Pernicious anemia, therefore, is shown to be a deficiency disease, although the exact error of the body chemistry has not yet been formulated.

Slight Ailments. The neglect of ailments that are transient and especially of those which recur at longer or shorter intervals is the cause of many serious illnesses. This is just as true of ailments which appear to be slight as of those which cause real suffering from such symptoms as pain, dyspnea, or vomiting. The treatment of slight ailments by household remedies, or by remedies formerly prescribed by the family doctor, may meet an emergency, but the continuance of such practices is against every precept of modern medical thought and can lead to the development of an incurable condition which, taken earlier, might have been foreseen and eliminated in its incipient stages. The early prevention of disease can often make prolonged treatment unnecessary, or check the development of a hopeless condition.

Conclusion. The methods of therapeutic procedure, which are useful in applying the principles of preventive medicine

to the individual case of infectious fevers and diseases classified under internal medicine, include the following:

1. The hypodermatic or intravenous injections of the dead bacteria or other germs causative of the disease—the *misnamed vaccines.*

2. The similar use of chemical antitoxins, specific for each disease, which are dissolved in the serum of an animal previously inoculated with the living germs, or with the toxins of the disease; or the use of human serum taken from a convalescent patient recovering from the disease—the *antitoxic sera.*

3. The intradermal or hypodermatic introduction into the lymphatic channels, of the living disease virus in a condition of attenuated strength—the *true vaccines.*

4. The administration of some drug known to be a specific poison to the disease germs.

The successful results of preventive medicine depend:

1. On the appreciation that many serious diseases begin as slight disturbances of health.

2. On the extension of a system of periodic health examinations to the whole community, in order that the recognition of the presence of slight ailments may be discovered and early treatment begun. These examinations should be made by the family physician and the interval between such examinations should be not longer than twelve months.

3. On the early knowledge that an individual has been exposed to some contagion.

4. On the possibility of a diagnosis being made or confirmed by an early bacteriological or chemical examination under medical supervision at a reliable laboratory.

CHAPTER V

ALLERGY

ROBERT A. COOKE, M.D.

IT will be necessary to define allergy and discuss the development of the allergic state in man, in so far as it is known and understood today, before taking up the discussion of its importance and its bearing in preventive medicine. The subject is difficult because there is no unanimity of opinion regarding the terms employed to express the types of allergy nor even concerning the details of the ultimate cause of this biological reaction. In fact, it is a question whether we are not dealing with several kinds of reactivities, the clinical expressions of which are sufficiently alike to have afforded reason for an assumption of identity of the origin and the mechanism of the reactions in detail. This is particularly true with regard to the question of cause—does or can the allergic state arise spontaneously, that is, without any known cause or previous contact with the specific reacting substance, or is it induced by previous contact?

The word allergy (meaning altered reaction) was originally used to connote certain specific reactions of man that were evidently induced and could be produced at will. Serum disease is the outstanding example of an induced allergy, the reaction occurring after an incubation period between the foreign protein injected and the body cells sensitized by the specific antibodies that were stimulated to production by the serum. The individual injected is, with the formation of these reacting bodies, in an allergic state and remains so for varying periods of months or years, and may be demonstrated to be so by the positive reaction of his skin to an injection of the

specific protein. The word "allergy" is also used to designate reactions induced to substances other than protein, such as arsenic. In fact, it is now applied to many of the reactions and reactivities of bacterial infections. The tuberculin reaction is a proper example of the specifically altered cellular response induced by the previous infection with tubercle bacilli. There is a great probability that many of the manifestations of infectious disease, such as the erythema of scarlet fever, are forms of allergy.

The general characteristic of this induced allergy is that it is the usual and therefore the normal response of body cells of man induced by previous specific contact, and inherited factors play no apparent rôle in the tendency toward or production of the reactive or allergic state.

But in contrast to the foregoing, there is an important group of specific reactions in man which exist in such a small percentage of the race that they cannot be considered the usual or normal response nor can they be artificially induced by contact. Here inherited factors play a very important causative part. Such reactions, designated as spontaneous, must be differentiated on practical and theoretical grounds, on account of the apparent differences of causation as well as seeming differences in the underlying mechanism of the reaction.

To emphasize the difference between the two types will do more to stimulate and promote the study of allergy than will the placid assumption of complete identity. To a large extent, I believe this confusion of induced and spontaneous allergy is due to the fact that both are evidenced by a similar symptom complex. For example, asthma may occur in an individual who has apparently become spontaneously sensitive (allergic) to, let us say, animal dander, but the same clinical picture also occurs in certain cases with an infection of the sinuses and bronchi. In fact, the two conditions may

co-exist. The same thing holds true for cases of urticaria and eczema. Some observers will take exception to this point of view and argue that under no circumstances does proof exist that the allergic state is spontaneous; and others will assert that there is no proof of even infective types of asthma being induced and not the result of a spontaneous allergic state.

Disregarding these hypothetical and esoteric discussions, we will now deal solely with the practical aspects of allergy, meaning thereby those reactions which are manifested by the commonly accepted clinical conditions of asthma, hay fever, vasomotor rhinitis, eczema, urticaria, and angioneurotic edema. Since it serves a practical purpose to distinguish between the apparently induced and the apparently spontaneous allergic states, these terms will be used.

Preventive medicine in relation to allergy suggests certain questions, as follows:

1. Can the development of the allergic state be prevented?
2. Can the clinical allergic reactions be prevented in allergic individuals?
3. What pathological conditions develop secondary to the various allergic reactions which make it important to prevent such reactions?

1. The Prevention of the Allergic State. *a. The Spontaneously Developed State.* In 1915, in a paper with Vander Veer, the writer showed the familial occurrence of certain allergic conditions, and this work has been substantiated by subsequent investigations. The findings can be briefly summarized.

The occurrence of the clinical allergies in the general population is about 5 per cent. In a group of apparently normal persons an antecedent history of allergy obtains in about 7 per cent, while among allergics an antecedent family history is obtained in about 50 per cent.

When the inheritance factor is derived from both paternal and maternal sides, 70 to 75 per cent of the offspring begin to have clinical allergy before the tenth year.

When the factor is derived from either the paternal or the maternal side, about 50 per cent of the offspring are affected, and clinical reactions usually develop between the fifteenth and the thirtieth year of life.

The reaction in the offspring may be of a different clinical form and to a different substance, showing that the inherited factor is rather a trait or tendency and not the condition itself.

We do not know what it is that determines clinical form and reactive substance in the individual, but these reactions develop to substances often so rarely met with and so sparingly partaken of, that one can scarcely avoid the conclusion that contact is not the essential factor in the determination of the allergen nor in the development of the relative state.

While it is evident that allergic factors are hereditary and often a serious menace to health and happiness, and while it might be wise to advise against the intermarriage of clinical allergics, from a practical standpoint this is probably impossible and we may as well conclude that the spontaneously developed inherited allergic state cannot be prevented.

b. The Induced Allergic State. An altered state of reaction exists in a fair percentage of those cases who receive foreign protein (serum) administered for therapeutic purposes, either subcutaneously or intravenously. It is evidenced by the reaction known as serum disease and by a positive cutaneous test with the specific serum. Park has shown that the prolonged allergic state following serum and toxin-antitoxin injections is of little or no clinical importance. It is manifested only by a shortened incubation period and an altered skin reaction.

Practically speaking, typical anaphylaxis in man is rare, though a few cases have been reported in which death occurred on the second injection of horse serum after a lapse of about ten days. Usually a second injection of horse serum is given with no symptoms other than perhaps a lessening of the incubation period of the serum disease. One word of warning is needed where a long interval, several months to several years, has elapsed after an uneventful serum injection. A true hypersensitiveness may have developed in the meantime, which has nothing to do with the first injection. A few years ago I saw at the clinic a negro girl about eighteen years of age who had had diphtheria antitoxin (horse serum) four years before, with no reaction. Two years later she developed asthma. When tested at the clinic with horse serum and horse dander she was markedly reactive by the skin test to both, and had a mild constitutional reaction with asthma. The following week when tested with rabbit dander and serum, she again reacted locally and generally and was even more sensitive than to the horse extracts. Using the horse tests alone one might have been tempted to assume that she had been sensitized artificially to horse products by the antitoxin, although by guinea pig experiment the dander and serum are different. But there is no factual evidence by which we could assume that the antitoxin (horse serum) had sensitized her to rabbit serum or dander, and since she had developed rabbit sensitiveness spontaneously it is reasonable to assume that she had also developed horse sensitiveness in the same way. Her reaction was not induced by the former injection.

Irrespective of all theories, however, the fact remains that the dangerous allergic reactions, sometimes resulting in death from serum injections, are preventable and all cases before receiving serum should be protected by the preliminary cutaneous and ophthalmic tests with the serum. Practically

speaking, it is an excellent rule that serum cannot safely be given if the ophthalmic test to it is positive, and especially if the patient has a history of asthma. All cases should be tested before serum is given.

The prevention of allergy from bacterial infections would be simple if bacterial infection itself could be avoided. Clinical histories in adults, children, and infants show that the allergic reaction of asthma occurs only after repeated upper or lower respiratory infections, and repeated acute infections are in turn induced or favored by chronic focal infections. In all such cases, and particularly in those with a family history of allergic reactions, careful search should be made and every chronic focus removed as far as possible. In infants and young children this means, essentially, the removal of tonsils and adenoids. From the age of six and upward, sinuses and teeth also must be carefully scrutinized. In my own experience the teeth are of importance in so far as they lead to infection of the antra. All such foci should be removed when possible, or drained before the allergic reactions have opportunity to develop. The importance of focal infection generally has probably been stressed in other chapters, and it is in this field that I think the family physician has one of his great opportunities.

2. The Prevention of Reactions in Allergic Cases. *a. The Spontaneous Allergies.* Granted that the allergic state has developed and, as explained, it frequently cannot well be prevented, all clinical reactions must be prevented as far as possible, for repeated attacks tend to increase the sensitiveness and, in asthma at least, favor the development of the asthmatic habit. Such prevention presupposes the accurate and complete diagnosis of all causal factors. It is not within the province of this communication to discuss the technique of diagnosis or to elaborate on etiology, but, assuming an etiologic diagnosis, the proper and best procedure is to avoid

the cause. In some cases dietetic or drug restrictions are indicated; in other cases in which air-borne substances are the cause, a proper environment must be maintained as clean and free from dust as possible. When removal cannot be satisfactorily effected, a resistance or immunity can be produced, temporarily at least, by the injection of the specific allergen. In hay fever, for example, very satisfactory results are obtained by the injection of pollen extracts.

b. The Induced Allergies. By the same means clinical reactions can be avoided in cases that have already become allergic from bacterial infections, by avoiding the cause, that is, removal of the source or its proper drainage. The treatment of infection by means of vaccine cannot be fully discussed here, as it would require a volume. It is much used, sometimes with good results, but it is also much abused. I have never seen vaccine therapy succeed in the face of a remaining causative infective focus. Much less can be said for the results from non-specific therapy, such as the injection of milk, peptone, tuberculin, and typhoid vaccine. In our last study of the infective group of asthma but 15 per cent were primary bronchial cases, and all the rest had persistent foci of infection.

3. The Reasons for Prevention of Allergic Reactions. The main reason for preventing allergic reactions once established in any individual is because of the tendency to recur with increasing frequency until the attacks are continuous, and a very considerable economic loss is sustained. This is well shown by Gay at Johns Hopkins in his recently compiled and very instructive statistics. In the second place, these reactions, especially those of asthma, hay fever, and vasomotor rhinitis, favor the development of infections of a persistent type in the upper and lower respiratory tracts, and such chronic foci of infection are responsible in turn for many important pathologic conditions, such as neuritis, arthritis,

and cardiac, renal, and arterial disease, which are the cause of long continued ill-health and untimely death. The medical profession is becoming increasingly aware of the vital importance of focal infection and that the allergies themselves not only predispose to them but also are due to them in many cases.

CHAPTER VI

TUBERCULOSIS

JAMES ALEXANDER MILLER, M.D.

TUBERCULOSIS is caused by infection with tubercle bacilli from preexisting cases of the disease in either man or animal. The human source is the usual and more important. Infection from cattle is through infected milk or milk products and is of importance primarily in childhood. Less than 10 per cent of all cases are from this source and these are mainly of the non-pulmonary forms of the disease.

Theoretically, tuberculosis can be eliminated by the complete protection of healthy individuals from tubercle bacilli. *Practically*, such complete protection is not feasible because of the widespread incidence of the disease in civilized society and the manifold and insidious opportunities offered for its spread.

This spread of tuberculosis may, however, be profoundly influenced by: (1) Diminishing the opportunities for infection with large doses of the bacilli; (2) lessening the chances for frequent and repeated doses of the infection, both large and small; and (3) increasing the resistance of the individual to the infection to which each is almost inevitably exposed.

Theories of Infection. *Portals of Entry.* The two main portals of entry of the infecting tubercle bacilli are the respiratory and alimentary tracts. The respiratory system is the usual route and infection here mainly occurs through the bronchi and the usual source is from tuberculous sputum. The alimentary tract is the more frequent route for milk infection which takes place through the intestinal mucosa. The tonsils and nasopharynx are common passages to both

the respiratory and alimentary tracts and may be the original portals of entry. The occasional occurrence of primary infection through the skin and mucous membranes outside of the pharynx and the bronchial and intestinal mucous membranes is too infrequent to have any great practical significance.

Localization of the Primary Infection. The researches of Ghon and Küss have demonstrated that the primary localization of the infection is in the lung. In cases of milk infection the bacilli passing through the intestines localize in the mesenteric lymph nodes, but even then show early foci of infection in the lung. Even in children where the clinical aspects of the disease are predominantly in the lymphatic system, especially the tracheo-bronchial glands, the earlier foci are in the lung with the lymphatic involvement secondary.

The Spread of the Infection. From the primary focus the spread of the infection is more commonly through the natural body passages, the respiratory and alimentary canals. Secondary lesions in the lungs are therefore bronchogenic; laryngeal lesions are due to the infected sputum passing through the larynx; and secondary intestinal lesions are mainly due to the ingestion of infected sputum. In other cases the lesion spreads in the lungs to contiguous parts by direct extension of bacilli, probably carried by phagocytic cells. In other cases, again, particularly in children, the infection, whether originally pulmonary or intestinal, spreads by way of the lymphatics to the contiguous lymph nodes where the evidences of disease may first manifest themselves. Lastly, extension may occur by way of the blood stream, the original lesion breaking into the smaller vessels, usually the veins, and by way of the heart the bacilli are carried to various parts of the body. These are instances of true blood metastasis and probably account for the cases of disseminated miliary tuberculosis and for the majority of the cases of infections in the organs outside of the respiratory and alimentary systems.

Childhood Infection and Reinfection. Children are particularly susceptible to tuberculosis and many succumb to the disease in early life. In the majority, however, the infection is slight and remains latent. Considerable controversy still exists as to whether the usual clinical tuberculosis of adult life is due to the activation of this latent infection or represents an independent reinfection. The hypothesis that an original childhood infection confers a certain amount of immunity to subsequent infection is generally accepted. Also the idea that tuberculosis of later life is an endogenous reinfection from an original childhood infection activated by various untoward strains or circumstances of life, is widely held and appears to be a plausible explanation of certain clinical phenomena.

In later years, however, experimental evidence appears to demonstrate that the immunity conferred by childhood infection is relatively slight and that exogenous reinfection can and does occur fairly readily under experimental conditions, and probably also in human adults. These facts have a practical bearing upon methods of prevention of the active disease of adult life.

Methods of Transmission of Infection by Sputum. For many years it was considered that the main danger of infection lay in the inhalation of dust infected by sputum which had become dried. Cornet was the early exponent of this theory which has been proved by his own and other experiments. Later Flugge demonstrated that the moist droplets of sputum expelled by coughing were also a real source of danger from inhalation by those in contact with such a patient. Inasmuch as these droplets are not exposed to the disinfecting action of light, presumably the bacilli are more apt to be virulent than those which have become dried and incorporated with dust.

Dust and droplet infections probably constitute the most frequent methods of transmission, but in addition, contam-

ination of the environment of the patient may offer opportunities for the indirect introduction of bacilli into the mouths of healthy individuals. Undried sputum upon floors is particularly apt to endanger young children at play, whose soiled hands so frequently enter their mouths. Similar contamination of bed clothing and linen may be a source of danger to those who handle these articles. The hands of patients are frequently soiled with sputum and may infect objects in common use, of which door handles are an example. Eating utensils and telephone transmitters may be similarly contaminated.

The dangers from all of these possible sources are of course much greater in confined spaces, such as living rooms and work places which provide opportunity for close and repeated contacts, and especially where sunlight is lacking. On account of their susceptibility as well as their ignorance of hygiene, the dangers from these conditions are especially great for children.

In general, however, it may be said that indirect methods of infection through the contamination of intermediate objects are relatively far less important and play a very minor rôle in the spread of the infection as compared with the direct transference from man to man through intimate and prolonged personal contact and from animal to man through infected food, mainly milk.

The Prevention of Infection from Sputum. The methods to be employed for the prevention of infection are developed from our knowledge of the modes of transmission.

The Segregation of Advanced or Careless Patients. The more general hospitalization of the poorer and less intelligent classes of patients has been a potent influence in the diminution of tuberculosis and is a fundamental necessity in any community. When, for various reasons, bed patients may remain at home, segregation in a separate room, from which

unnecessary visitors and especially children are excluded, is necessary.

The Education and Control of the Patient. The patient should be thoroughly grounded in habits which will prevent the dangers from the sputum, and in the reasons therefor.

Care of Sputum. Every cough or sneeze should be covered by handkerchief or gauze. All expectoration, even out of doors, should be into proper receptacles which can be burned. Ambulatory patients should carry pocket cuspidors or oil silk bags to contain soiled paper or gauze handkerchiefs. Bed patients should use paper-box cuspidors or dispose of handkerchiefs in paper bags pinned to the mattress. When burning is impracticable the sputum may be disinfected by liquid germicides before disposal into the toilet.

The Control of Cough. Much can be done to control the frequency and severity of cough by conscious effort. This makes control of sputum easier, lessens the irritation of the throat and the risk of laryngeal involvement, and enables the patient to get more rest.

Hygiene of Mouth and Hands. The mouth should be kept clean by frequent antiseptic gargles and the teeth scrupulously cared for. Sputum should never be swallowed on account of consequent indigestion and especially the danger of secondary intestinal tuberculosis. The mouth and lips and especially the hands should be washed frequently and thoroughly. Mustaches and especially beards should be shaved.

The Care of the Patient's Environment. Soiled bedding and linen should be kept separate for the laundry. Pieces grossly soiled with sputum, such as handkerchiefs, should be first soaked in a disinfectant solution. Unwashable clothing and blankets are best disinfected by prolonged airing in the sunlight. Fumigation for woolens and unwashable clothing may be employed but is not essential. Cleanliness and the free access of sunlight are the best disinfectants.

Rooms occupied by patients should be kept scrupulously clean with soap and soda solution with especial attention to the floors, baseboards, and door handles. Eating utensils should be scalded after use.

The physician in charge is quite as responsible for the institution of these safeguards as for the welfare of the patient. When he is unable to give these precautions personal attention they should be delegated to a nurse or requested of the public authorities. One of the very important advantages of sanatorium or hospital treatment is the resulting training of patients in habits of hygiene which should become automatic.

Inasmuch as the amount of infected sputum becomes greater as the disease advances, the early diagnosis and treatment of the disease constitutes an important preventive as well as an essential remedial measure. The responsibility for this rests mainly with physicians.

Phthisiophobia. With proper supervision of the patient and his environment, and especially with thorough training of the patient in sanitary habits, a tuberculous patient is a perfectly safe associate. Exaggerated emphasis upon the dangers of infection and inadequate knowledge of the protection that proper conditions will provide are largely responsible for the fear of association with tuberculous patients which often causes much unnecessary suffering. The physician is responsible for the dissemination of wise counsel which will protect the healthy from infection and the patient from injustice.

Public Measures of Prevention. The public authorities are charged with the responsibility of affording protection to the community along certain definite lines. The particular procedures are based upon the results of scientific investigation, and change as our knowledge expands. In the case of tuberculosis the methods have become more nearly standard-

ized than in many other communicable diseases but must still be considered as only relative in their efficiency.

Registration. In most states and cities of this country physicians are required by law to report cases of tuberculosis to the health authorities. This constitutes an accounting system for public health and serves a most useful purpose in determining the extent and distribution of the disease and in providing a basis for the institution of preventive measures and gauging their efficacy. The systematic reporting of such cases thus becomes a legal and professional obligation upon physicians.

Sanitary Regulations. Anti-spitting laws are effective only when supported by the sentiment of the community. In the United States remarkable progress has been made in the suppression of the insanitary and disgusting habit of promiscuous expectoration, and public sentiment now supports the occasional instances in which the enforcement of the law may be required.

The isolation of careless consumptives in hospitals is provided by law in some communities, but such isolation under compulsion is rarely necessary, largely due to the more general appreciation of the necessity and advantages of hospital care for advanced cases.

Disinfection of the premises formerly occupied by patients with tuberculosis who have moved or died is required in many communities. Experience has shown that thorough cleansing with soap and water and soda solution combined with the free access of sun light is preferable to fumigation. Fumigation or destruction of certain articles of clothing and bedding which can not be washed is, however, frequently desirable and is often provided for by the health authorities at public expense.

The supervision of food supplies is a public health responsibility which in the case of tuberculosis applies mainly to the production and distribution of milk.

The physical examination and lincensing of food handlers, when competently carried out, may also be a factor in prevention of infection through food. The same is true of those whose work brings them in close contact with children, such as school teachers and nurse maids.

In general, it is the duty of physicians to be familiar with health ordinances and to cooperate fully with the health authorities in carrying them out. In instances where the performance of this duty appears to conflict with the personal sensitiveness of individual patients, the dilemma can usually be solved by tact and firmness. In the exceptional instances where this is impossible, the first obligation of the physician is to the law and to the interests of the community rather than to the individual.

Health Education. Popular education regarding the causes, the prevention, and the treatment of tuberculosis has become very widespread in this country. Under the leadership of the health authorities, materially aided by numerous non-official health agencies, this has become a very powerful agent in the promotion of health and the prevention of disease. In the case of tuberculosis this general education has been particularly well developed and effective.

The opportunities of private physicians to supplement the general information thus disseminated by individual instruction to patients and their families are very great and could be more systematically utilized than they are. The role of the physician as an individual health agent is a real professional responsibility which is being too slowly developed.

Improved Individual Resistance to Tuberculosis. The prevention of infection is only one phase of the prevention of tuberculosis. As already noted, slight infection with tuberculosis is almost universal and a most important role in the prevention of developed disease is played by measures

which will enable individuals successfully to resist the infection to which all are sooner or later liable.

Child Welfare. The systematic efforts to improve the health and welfare of children, which have been such a prominent feature of the modern health movement, have had a very important influence upon the prevention of tuberculosis. The emphasis placed upon the proper feeding and environment of infants and young children has protected them in no small degree from tuberculous infection both from food and from contracts during a peculiarly susceptible period of life. It has also laid the foundation of better nutrition and general health during the developmental period which increases the resistance to the later infections and strains of adolescent and young adult life. This applies not only to feeding, but to the diminution of other infectious diseases, to the improved care during convalescence from any disease, and especially to the management of children physically subnormal from any cause.

The child welfare and antituberculosis campaign therefore complement each other and in many particulars have common aims and common methods. There can be little doubt that a considerable portion of the diminution in disease and death from tuberculosis is attributable to the general improvement in the care of children.

Open-air Life. The joy of the open-air life has always been the privilege of the few but the appreciation of its necessity as a health-giving measure for all is a comparatively recent development. Health education through the antituberculosis campaigns has been responsible for this to no small degree.

The habit of open-air or out-of-door sleeping, the destruction of the damp night-air myth, the improvement in ventilation of buildings, as well as more general habits of out-of-door life, recreation, and exercise, have all closely

followed the propaganda against tuberculosis, which in turn was founded upon the results obtained through the open-air treatment of the disease.

Serving a double purpose of diminishing liability to massive infection and improving the general health and resistance of the individual, the doctrine of open-air life justly deserves the emphasis that has been placed upon it as a preventive measure.

Closely allied to open air is the beneficial effect of *sunshine*. In modern city life sunshine is all too rare in dwellings, school rooms, and work places. Every effort should be made to obtain it, especially for predisposed individuals, both indoors and out.

For subnormal children with or without latent tuberculosis, for those in contact with cases of tuberculosis, and for convalescents from all diseases, it is particularly desirable; and light baths, either directly from the sun or from artificial sources of light such as ultra-violet lamps, have become a therapeutic and preventive agent of great value.

Nutrition. In childhood and young adult life the maintenance of good nutrition is a preventive measure of prime importance. The effect of a prolonged subnormal diet, especially that low in fats, upon the development of tuberculosis was very strikingly shown in the experience of many European nations during the world war.

Persistently subnormal weight in young people constitutes a real hazard to tuberculosis, and everything which contributes to under-nutrition in the young should be the special concern of physicians.

Minor physical defects, such as bad teeth, diseased tonsils and adenoids, poor digestion, faulty habits of eating, improper diet, as well as more general detrimental habits, such as lack of sleep, improper exercise, over-work, nervous

strain, and foolish weight-reducing are all factors of importance upon the correction of which medical advice should be insistent.

Economic factors beyond medical control are, of course, frequently operative, and there can be little doubt that the generally improved standard of living in this country has had a potent influence upon the diminished death rate from tuberculosis. The influence of the medical profession should always be on the side of the promotion of such standards.

Convalescent Care. Convalescence from any serious illness is accompanied by a lowered general vitality which offers a favorable opportunity for a latent tuberculous infection to develop into active disease. This is especially true of respiratory diseases, such as influenza, pneumonia, pleurisy (often tuberculous), measles, whooping cough, and the like. All too frequently convalescents from these and other diseases return to active life too soon, unrestrained by medical advice. Better and more prolonged convalescent care for hospital cases is much needed, but there is also a great need for a more insistent medical demand for better care during these periods of lowered resistance, among both the hospital class and those more well to do.

Personal Habits. Many untoward personal habits of living or of working have been considered as they affect the nutrition problem. They may also unfavorably affect the general health and resistance of the individual in other ways. Particular emphasis may be placed upon alcoholism, excessive smoking, dissipation of all sorts, as well as less reprehensible habits easily acquired in the stress of modern life and work.

Health is rarely a consideration in the life of individuals until it is either threatened or lost. The forward-looking modern physician may often point to the danger and offset the tendency before the actual physical break-down. The privilege of intimate knowledge of the personal and family

life of their patients offers frequent opportunities for wide counsel which is a true part of the practice of medicine.

Working Conditions. Some indirect effects of faulty habits or conditions of work have already been considered. Certain industrial conditions may be directly injurious to the lungs and thus predispose to pulmonary tuberculosis. These are mainly the dusty trades where no adequate respiratory protection is afforded the workers.

Pneumonoconiosis results from long-continued exposure to particles of hard dust, such as steel, stone, or coal. Inorganic dust, such as cotton or wool fibre, tobacco, wood, etc., may produce chronic inflammatory changes. In all of these trades, with the exception of coal mining, an unduly high incidence and mortality from tuberculosis is found.

The indirect effects of bad working conditions, such as long hours, poor ventilation and lighting, and excessive strain, are, however, more important as they affect larger units of the population and when combined with other untoward social conditions are undoubtedly a real factor in the causation of active tuberculosis.

The great improvement in the conditions of labor of recent years, due to the combined action of public opinion, protective legislation, labor unions, and the changed sentiment of employers, will have an increasingly favorable effect.

The Strains of Living. Accepting the reasonable hypothesis that much adult tuberculosis is due to the activation of a preexisting latent infection, it is evident that stress and strain of many sorts may be exciting causes of such activation. Viewed from this angle, the problem of prevention becomes that of eliminating or reducing the probability of latent disease becoming active disease.

There is a close analogy here between treatment and prevention. Our best results in the treatment of tuberculosis are obtained by that long-continued, quiet, and protected

method of living exemplified by the sanatorium regimen. Deviation from this schedule usually leads to further extension of the disease in the ways already discussed. Similar, though less rigid, methods are applicable to the cases of latent disease. We have seen that activation of disease is particularly liable in individuals, known to have been in close contact with the disease, who are below par from poor nutrition, convalescence from other diseases, or other causes. Added to this we have the strains, the modern complex life, especially in cities, the struggle for existence and social or economic advancement, the physical strain of pregnancy in women, and the nervous tension so characteristic of American life.

Rest and Recreation. The need of proper adjustment to these conditions of modern life applies to everyone, but especially to the predisposed group of individuals. Regular periods of rest and recreation are essential, but not always recognized, and wise medical guidance is nowhere more helpful.

More general familiarity with the methods of the sanatorium care of tuberculosis on the part of medical practitioners is very desirable as a basis for the application of the same principles to the problem of prevention.

Health Examinations. The practice of periodic health examinations for apparently well people is gradually becoming more general. Life insurance and industrial medical practice has greatly stimulated this movement. In private practice physicians have lagged behind and it would appear that we might with advantage follow the lead of the dentists in this respect.

Medical training has been almost exclusively with patients who present symptoms. Health examination demands a quite different attitude of mind and method of approach which requires special experience and training.

Properly performed health examination affords unusual opportunities for detecting unsuspected cases of early tuberculosis which may give few or no symptoms, and also a chance to discover and correct some of the faulty habits of living which, as we have seen, have so important an influence upon the development of the disease.

Public sentiment is demanding this service which the medical profession must be prepared not only to give but to encourage, if physicians are to contribute their proper share to modern preventive medicine.

Preventive Vaccination. The protective influence of small tuberculous infections, relatively slight though it may be, has stimulated the hope of the discovery of some similar but surer method of vaccination by artificial means.

Calmette has recently expressed his confidence in the efficacy of his B.C.G. vaccine when fed to infants during the first weeks of life. This vaccine consists of cultures of living but avirulent tubercle bacilli prepared by growth upon special media. In spite of the weighty support of Calmette's scientific reputation and the very widespread use of this vaccine at the present time in Europe, there is still reason to doubt that its efficacy has been fully proved. It may, however, at least prove to be a step toward the ultimate realization of a safe and effective method of vaccination against this disease.

The Responsibility of Physicians in the Prevention of Tuberculosis. We have passed in brief review the underlying principles of these two main methods of preventing tuberculosis. We have seen that the absolute protection from infection is at present impossible, if, indeed, it is desirable; and that the most important measures are segregation of open cases in institutions and the observance of such sanitary precautions as will prevent frequent and massive doses of infection.

On the other hand, the methods by which resistance to infection and to its development into active disease may be enhanced, are very numerous and varied. It is in this latter phase of prevention that an increased interest and cooperation of physicians appears to need encouragement.

In recent years organized antituberculosis work as represented by public health authorities and many unofficial organizations has been placing an increasing emphasis upon the importance of these direct methods of prevention. Physicians trained to care for the sick, but unorganized as a group to deal with the prevention of disease, have not fully kept step with this progress.

They, however, occupy the main strategic position because of their scientific training and the intimate character of their relations to their patients. To make the best use of this opportunity, a broader conception of their responsibility for the prevention of disease is essential. Properly put into practice, this conception will enable us to render services to mankind even more valuable than the high ideals of curative practice which are the proud heritage of our profession.

CHAPTER VII

THE SURGICAL ASPECTS OF PREVENTIVE MEDICINE

CHARLES GORDON HEYD, B.A., M.D., F.A.C.S.

"Every late case was at one time an early one."

FROM time immemorial man and his physicians have been concerned with the broad outlines and expediencies embraced under the term "preventive medicine." It is only within recent years that the dissemination of knowledge obtained from the operating amphitheater has enlarged the entire field of pathology, and with it the aspects and application of preventive surgery have come into being. Periodic health examinations connote a desire to interpret the physical machine in terms of usefulness and longevity. The resources of surgery are ever on the alert to initiate surgical intervention for pathological changes at the beginning; before there is much tissue change, before the immunological processes of the body have been exhausted, and before the effects of inflammation have become marked and permanent.

The problem presented to the surgeon is essentially the prevention of the disabling and lethal terminations of surgical conditions which in the beginning are curable by simple operative intervention without danger of morbidity or death.

There are certain surgical procedures that are emergent and are utilized as the only available means at hand for the prevention of death. One must view tracheotomy, colostomy, ileostomy as measures employed primarily to prevent an immediate mortality and indicated for mechanical conditions irrespective to their curative value.

Chronic infections exhibit three more or less well-defined syndromes: (1) The changes that are general and applied

to the metabolism as a whole, such as loss of weight, hypertension, arteriosclerotic changes, and the cardionephropathies, as well as the late endocrine disturbances of the thyroid, ovaries, or testes. (2) The remote and ill-defined effects of chronic infection: neuralgia, myositis, and arthritis. (3) The local symptoms that pertain to the organ originally involved.

Syphilis as a cause of ill-health, invalidism, and death is not sufficiently recognized even at the present day. Syphilis may simulate any disease and a Wassermann examination of the blood is always indicated, and occasionally one of the spinal fluid as well.

Considerable disability and many symptoms result from pathological processes within the nasal cavities. Deviated septum, large turbinates, defective breathing spaces, discharges from the sinuses, and the presence of polyps should engage the attention. Red and inflamed tonsils are often suggestive of infection and the ability to express caseous or purulent material from the tonsils is a strong indication of chronic tonsillar infection. By means of transillumination infected teeth, apical abscesses, and sinus disease can ordinarily be detected and suggestions made in order to prevent future disability in the form of arthritis, myositis, neuritis, endocarditis, and a variety of the nephropathies.

Carbuncles and Furuncles. A carbuncle on the back of the neck is always an extremely dangerous condition and should not be considered lightly. Furuncles of the lip, nose, face, and chin are associated with a greater prospect of danger than furuncles at other sites, as they are particularly prone to induce thrombosis of the facial veins with meningitis and septicemia. The surgical indication in all furuncular infections is to institute drainage. One of the simplest and easiest ways of doing so is to puncture the center of the pustule or inflammatory mass with the point of a triangular needle

after being dipped in pure phenol and by rotating the needle in situ to burrow a tunnel to the center of the inflammation. A little wisp of drainage can then be inserted down the passage and the wound covered with a wet dressing. It is surprising how quickly and without marked disturbance these conditions will respond to this treatment. The occasional occurrence of a pustule on the face, nose, or neck of extremely angry appearance, followed by a group of vesicles with a thin, watery discharge and a central black slough should occasion suspicion of malignant pustule, particularly if occurring on a fur-worker.

Wens. One of the most common tumors on the surface of the body and which when infected gives rise to considerable disability is the ordinary wen or steatoma. This is to be distinguished from fibroma, lipoma, or even gumma, by the known fact that at some one point a wen is adherent to the skin, whereas subcutaneous tumors are nowhere adherent to the skin.

Actinomycosis. This involves ordinarily the upper jaw, lungs and pleura, or any part of the alimentary canal, particularly the cecum, appendix, and liver. It calls for early recognition, and local excision where possible together with the administration of potassium iodide in large doses.

Vincent's Angina. This disease is on the increase and exhibits marked variability. This condition had wide prevalence in the Army during the late war and was designated "trench mouth." It may occur as a single spot a few millimeters in diameter or be very diffuse in character. The latter form simply represents a multiplicity and fusion of single areas. The individual unit is a red, intense "spot," with an irregular, ill-defined border suggestive of erysipelas. In the center of the area is a white patch exhibiting central necrosis. Unlike leucoplakia this "spot" is always surrounded by an inflamed mucous membrane. I have never observed

this condition in a toothless mouth. Sodium perborate paste 1:4 is a specific for Vincent's angina.

Thyroid Disease. The increasing prevalence of goiter necessitates its early recognition. Every cell in the body needs thyroxin to perform its function properly. Deficiency of thyroid secretion may be due to: (1) congenital absence or lack of function; (2) the surgical removal of too much thyroid; (3) the destruction of thyroid by radioactive agents, as in the treatment of glandular conditions of the neck; (4) the reduced activity of the thyroid itself, and finally (5) a dysfunction associated with an iodine deficiency. Thyroxin is made up of 65 per cent iodine and the thyroid gland must obtain approximately $22\frac{1}{100}$ of a milligram of iodine per day. It is probable that most of the patients that develop thyroid enlargement have some natural basic factor at work, for the vast majority of persons showing thyroid enlargement in later life have had a preceding adolescent goiter. The normal functioning thyroid would presuppose a normal intake of iodine with normal digestion and normal absorption together with the efficient utilization by the thyroid. There is therefore the basic necessity of a normal intestinal activity for the proper absorption of iodine. A pregnant woman may secrete enough thyrotoxin for her own metabolism and yet be unable to secrete an amount sufficient for the combined metabolism of herself and child.

In geographical localities where colloid goiter is endemic the giving of Lugol's solution, or other preparation of iodine, has acted as a rather marked preventive of goiter development. This is particularly so in municipalities where it has been tried under proper conditions of control. It was found in a survey in Dayton that 40 per cent of the children had palpable and visible enlargement of the thyroid gland. It is, however, a question whether a municipality should treat the water supply with iodine or whether iodine salts should be

used in place of common table salt at meals. Great caution must be exercised in the giving of iodine to patients with a thyroid gland containing adenomata, as its administration is fraught with danger. Iodine in adenomata has a very definite tendency to change a relatively nontoxic adenoma into one that is characterized by varying degrees of hyperthyroidism. The giving of iodine has no place in the treatment of Graves' disease except as a pre-operative measure and then for a limited time only. The giving to a patient with Graves' disease ten or fifteen drops of Lugol's solution two or three times a day, together with rest in bed and proper sedatives for a period of a week to ten days before operation has about the same value in removing the lethal possibilities of surgery as that formerly obtained by a bilateral ligation of the superior poles of the thyroid. It should be clearly understood, however, that it is only a temporary procedure in the way of preparing a patient to go safely through a surgical operation.

Hyperthyroidism is about the only condition associated with marked tachycardia that continuously permits one to do most of the ordinary activities of life without confinement to a sick room. The basal metabolic tests may be used to differentiate the tachycardias associated with nervous instability and those that are due to dysfunction or overfunction of the thyroid. The increasing frequency of goiter of colloid type due to deficiency of thyroid secretion should be noted and medicinal measures for its correction employed early. After a thyroid has undergone colloid degeneration with a distinctly visible and palpable tumor little retrogression can be expected by the administration of iodine or thyroid extract.

There is still another group of thyroidal abnormalities, occurring in the young, usually females, from sixteen to twenty years of age, representing a hyperthyroidism of adolescence, a true functional hyperplasia, associated with

most of the stigmata of subnormal physical development. These cases are corrected by the judicious administration of iodine medicaments.

In view of the widespread and indiscriminate use of iodine for any thyroid enlargement, it seems wise to epitomize the present indications for the giving of iodine or iodine preparations in goiter: (1) Iodine is a drug and its use in goiter therapy should be entirely in the hands of the physician. (2) Iodine is preeminently useful in goiter prophylaxis; it is immaterial how it is administered or in what form, providing the dose is small and the treatment intermittent. (3) It is useful in stabilizing function in the colloid type of goiter, but care should be exercised to eliminate adenoma in the diagnosis; adenomata are infrequent before twenty years of age. (4) It is distinctly indicated as a preventive measure, either in or out of regions of high goiter incidence during pregnancy and lactation, and the menopause. (5) It is distinctly indicated for a short period of time but without a gap as a preoperative measure in Graves' disease. (6) It is indicated as a postoperative measure after all types of goiter operation. (7) Its use in adenomata is variable but preeminently dangerous as initiating hyperthyroidism in non-toxic adenomatous goiters. (8) When used outside of restricted indications above noted its use has an inherent danger of producing an iodine hyperthyroidism which is fixed, progressive, and dangerous.

Cervical Rib. This condition either unilateral or bilateral, is a congenital anomaly, but strangely begins to give symptoms first in adult life. The brachial vessels and nerves always pass over the supernumerary rib, never under it, and hence are subject to pressure and angulation. The symptoms are those of neuralgic pains referred to the arm, or anesthesia, and the symptoms are always made worse by carrying weights.

Tumors. All tumors of the body are divisible for diagnostic purposes into: (1) congenital, (2) traumatic, (3) inflam-

matory, and (4) neoplastic. Congenital tumors are usually midline if arising from single organic remnants such as thyroglossal cyst, spina bifida, and urachal cysts; unilateral or bilateral when arising from bilateral organic remnants such as the branchial arches, kidneys, or ovaries. In traumatic tumors there is always the history of injury. The inflammatory tumors readily group themselves into the acute manifestations characterized by the classical exhibition of heat, swelling, pain, redness, and lack of function. The chronic inflammatory tumors represent either tuberculosis, syphilis, more rarely actinomycosis, glanders, or malignant pustule. In considering the neoplastic tumors the attempt should be made to identify the tissue from which the tumor arises, that is either ectodermic, mesodermic, or endodermic. Tumors arising from the gut tube—endodermic, or the external surface of the body—ectodermic, are usually papillomata, polypi, or carcinomata. Tumors arising from the middle layers—mesodermic, are either sarcoma or fibroma, adenoma, chondroma, lipoma, endothelioma, or osteoma, etc., in various combinations and frequently exhibiting diverse combinations with sarcoma.

About the neck is a well-defined collar of glandular tissue representing six very discrete aggregations of lymph glands: (1) the submental group, (2) the submaxillary, (3) the parotid, (4) the mastoid, (5) the occipital, and (6) the pharyngeal. Tuberculous adenitis almost invariably involves the submaxillary or parotid and the largest gland is the gland nearest the mandible and highest on the neck. As the infection extends down the neck the lower the gland the less it is affected so that tuberculous adenitis appears ordinarily like an inverted cone. Hodgkin's disease, or malignant lymphoma, usually involves first the glands above the clavicle and hence we have the upright cone of non-tuberculous enlargement of the neck. A glandular enlargement in the neck, with-

out suppuration that is secondary to or concomitant with a chronic tonsillitis, is usually brought into a condition of quiescence by removal of the tonsils. The possibility, however, of Hodgkin's disease being associated with some type of oral infection should always be considered.

The presence of chronic glandular enlargement of the groin, secondary to infection about the toes, nails, or foot, is a matter that distinctly lies in the field of preventive surgery. The "curing" of all lower extremity infections effectively prevents secondary involvement of the groin.

Precancerous Lesions. The broadest field of preventive surgery is the early recognition of lesions that are precancerous and lead inevitably to the development of malignancy. Cancer never begins in healthy tissue but is the result always of a preexisting local defect which in the beginning is benign and later becomes malignant. At the present time one out of twenty individuals over forty years of age dies of cancer. Most of the patients with cancer exhibit for a long period of time certain definite precancerous lesions: (1) on the skin in the shape of warts, moles, or nevi; (2) or beneath the skin as small tumors, or deep in the glandular tissue of the breast or thyroid; (3) unhealed ulcerations of skin or membrane; (4) chronic irritations with inflammatory reaction but without ulceration. The early diagnosis and removal of these precancerous lesions insures practically 100 per cent prevention. Almost all cancers except those ingrafted upon unhealed ulcers begin painlessly, hence pain is of no value for or against the diagnosis of malignancy.

Among the areas of the body that are under direct visual observation in which the development of a precancerous lesion is capable of recognition are the mouth, tongue, lips, breast, and cervix. Chronic cystic mastitis and eczema of the nipple must be considered essentially precancerous lesions.

An unhealed ulcer anywhere on the surface of the body that scabs and after a time the scab falls of, to be followed by a second scab and so on, each succeeding scab being somewhat larger than the preceding one points to the progressive character of the ulcer and a strong presumption of malignancy. There are a group of neoplastic conditions of the skin that are for many years benign in character, which undergo degenerative changes, passing by slow degrees into types of malignancy. The removal of papillomas, warts, should be urged before gross changes have taken place. The most devastating type of malignancy is that associated with melanosis—melanosarcoma. Tumors of this kind invariably begin as a simple pigmented mole, which becoming irritated undergoes a metaplasia with widespread bodily dissemination. It is a matter of common observation as to the number of men that have smokers' burns, "the little blue spot on the lips," representing the reaction of the mucocutaneous tissue to chronic irritation and which is in many cases the precursor of carcinoma. The precancerous lesions of cancer of the tongue are invariably associated with sharp-edged, dirty teeth and the habitual use of tobacco. Within the mouth the jagged teeth, the poorly aligned teeth, and the long continued papillitis of the tongue offer a site for the development of malignancy. It may be safely said that any chronic ulcer of the tongue or lip, appearing in a man over forty years of age, must be taken to be cancer until proved otherwise. There is a strong opinion that leucoplakia is due to tobacco and to tobacco only. Vincent's angina never leads to cancer, while leucoplakia, the fibromas, and ulcers are the precursors of malignancy.

A great deal of misconception exists in the minds of many practitioners as to the relative dangers of biopsy. It may be accepted that there is very slight danger in removing a portion of tissue from a free and easily accessible

surface, such as the rectum or cervix. While there is considerable danger of spreading malignancy if one has to make an operative approach through normal tissue in order to obtain the specimen, such as would occur in the removal of a breast or bone tumor. The question of biopsy or accurate determination of a tumor must be viewed in the light of one of two evils. An accurate knowledge of the character of the tumor is of more value than the possibility of some slightly added danger through removal of the tissue. It is at once apparent that if a tumor is innocent from a histological standpoint the avoiding of a grave or crippling operation is of equal importance possibly with the knowledge that if the tumor turns out to be malignant a grave procedure has not been undertaken in vain. The dangers of biopsy are far less than allowing a condition to proceed of its own accord until declarative symptoms of its identity are made. Every late surgical condition, every late medical condition, every late operable or inoperable cancer was in the beginning an early case.

Carcinoma of the esophagus begins in an extremely insidious way and not with gross obstructive symptoms. The presence of a little catch on swallowing or regurgitation or a slight substernal pressure upon deglutition are significant signs and occurring in persons at or about forty years of age or over should be thoroughly investigated.

Seventy per cent of all breast tumors occurring in women over thirty years of age are actively or potentially malignant and 15 of the remaining 30 per cent which are benign in the beginning will eventually become malignant. The chances are that in 85 per cent of the patients with a lump in the breast which is left undisturbed, the tumor will eventually become malignant. Here is a great field for preventive surgery, for it may be accepted as a surgical injunction that every tumor in a woman's breast should be removed and its histo-

logical character immediately established by frozen section. It is a surgical truism that simple excision is a cure before the onset of malignancy while the most radical operation after the advent of malignancy is followed by a high percentage of recurrence. In carcinoma of the breast we are certain that if the lymph glands are palpable there is every reason to suppose that there are microscopic metastases in the glands that cannot be determined by the palpating finger. It is interesting to recall in regard to breast tumors, that 70 per cent of woman operated upon for breast carcinomas are alive and well after radical operations when there had been no palpable axillary involvement, and yet only 30 per cent are alive and well after five years when there had been axillary involvement at the time of operation.

Any deviation from the normal menstrual history should be regarded with suspicion. The presence of bleeding between periods, after coitus, after exertion, after defecation or urination, is strongly suggestive. Bleeding from the uterus after the menopause usually means carcinoma or a polypus. A thin, watery, irritating discharge, having strong odor, and occasionally blood stained, is a precursor of actual bleeding from carcinoma. To wait for loss of weight and pain is to wait for late symptoms. Diagnosis is usually upon suggestive symptoms rather than upon positive declarative ones. Increase in the length of the menstrual flow or changes in the character of its blood are suggestive of uterine tumor, although not necessarily malignant. Extension of the menstrual history beyond the time of natural expectation for the family and the individual is significant of fibromata of the uterus. The early detection of fibroids means early treatment and prevention of extensive mutilating, shock producing, death-ensuing operations. The early diagnosis and treatment of fibroids, for example, will prevent the associated myocarditis and will obviate the dangers

of malignancy. The routine examination of the cervix, particularly in the multipara, the correction of chronic cervical erosions and chronic cervical discharge will also prevent many cases of malignancy. Cancer of the cervix, as opposed to cancer of the body of the uterus, is the difference between a relatively active-growing and a relatively slow-growing carcinoma. Cancer of the cervix rapidly infiltrates, and metastasizes early and quickly; carcinoma of the body of the uterus remains local for a long period of time, spreads slowly, and metastasizes quite late.

Changes in the character of the vaginal secretions, ulcerations of the cervix, ectropions, and endocervicitis are the precursors of cancer.

Cancer of the uterus so far as ordinary observation and palpation are concerned should be placed with carcinoma of the external body surface and may with justice be placed in the group of preventive diseases.

Alcohol to some individuals is deleterious at all times and its use should be prohibited or very distinctly curtailed. The use of tobacco particularly is quite common among both sexes at the present time and is a matter that should well engage the attention of the physician. While tobacco may be used by many persons in moderate quantities without bad effects, not infrequently it brings about very distinct evidences of its harmful effects, manifested by defect of vision, disturbances in the rhythm of the heart beats, and occasionally cardiovascular disturbances of greater significance. It is well to recall that considerable gastric distress is caused by the use of tobacco, and one must not forget that tobacco is also capable of producing spasm of the colon, resulting in attacks of discomfort and pain.

Indigestion. This is one of the most common of all of the symptoms in clinical medicine, and in numerical frequency is probably only second to headache. Indigestion may be defined

as any gastric malfunction associated with the ingestion of food or with fasting, characterized by a variety of symptoms of which flatulency, sour eructations, heartburn, and pain are the most common. Forty per cent of all cases of indigestion arise from causes entirely remote from the abdomen. It is well to remember that amongst the most frequent causes of indigestion are chronic tuberculosis, heart disease, nephritis, eyestrain, chronic sepsis of teeth, tonsils, or nasopharynx. Forty per cent of the cases of indigestion are due to causes within the abdomen but remote from the stomach, such as diseased appendix, diseased gall bladder, tubo-ovarian infection, or tuberculous peritonitis, and that only 20 per cent of the patients complaining of indigestion are primarily subjects of intrinsic stomach disease.

Abdominal Affections. It may be said that the single, most outstanding cause of mortality among young adults in a general hospital service is perforating appendicitis, and surgery undertaken at the time when pus or gangrene is present is associated with a very high mortality. Experience shows that almost without exception all the cases of acute ruptured appendix, perforating appendicitis with peritonitis, have had drastic cathartics previous to their admission to the hospital. It may be taken as axiomatic that there is hardly any acute abdominal condition in which an enema will not suffice to accomplish as much good as a cathartic and as a corollary there is probably no intra-abdominal condition which will be made worse by a temporary delay in the use of a cathartic. In the presence of any acute abdominal pain, the outstanding indication, whether the diagnosis has been made or not, is to bring about intestinal rest. That this contention is supported by clinical facts is evidenced by the distention and tympanites that rapidly ensue in the presence of an intra-abdominal lesion. In such a condition, the giving of a drastic cathartic forces the bowel to unusual activity and this

increased peristaltic activity is the greatest cause for the diffusion and spread of infection. In such a condition an enema will relieve the lower bowel of gas and feces, will not stimulate peristalsis and will allow the remainder of the intestines to be at peristaltic rest and so safeguard the patient. In the presence of any peritoneal infection it is highly desirable that the infection be kept local or that a spreading peritonitis be transformed into a localizing condition.

In the case of a crying baby, under two years of age, with intense abdominal cramps, the passage of blood is almost pathognomic of intussusception. Acute intestinal obstruction and intussusception are almost synonomous terms in children under two years of age. The early recognition of this condition, and incidentally there are few abdominal conditions so clear cut and striking, means that by operative intervention the intussusception will be reduced and mortality almost entirely prevented. In a child complaining of cramps it is important to recall the frequent association of what may be termed "peritonismus" with pulmonary affections. The undeveloped or silent pneumonia in a child may cause localized pain in the abdomen, spasticity and the signs of abdominal affection. In a true abdominal infection, while the respirations may be increased in frequency and of a "catchy" type, there is always a parallelism between pulse, respiration, and temperature. In intrinsic pulmonary infection in children there is a disturbance of ratio and an acceleration in respiratory rate. This is an important point to remember in differential diagnosis.

The onset of acute abdominal cramps with forcible, expulsive vomiting in a patient who has had an abdominal operation should suggest the possibility of intestinal obstruction due to angulation or volvulus.

The rôle of chronic disease of the appendix or cholecystitis as a causative agent in infection of the kidney is exhibited

in the frequency with which right sided bacilluria and pyelonephritis are found in women.

It is a matter of common knowledge that acute gastroduodenal perforations are sometimes mistaken for acute perforative appendicitis. Perforation is the most serious and lethal complication that may occur in the biological history of peptic ulcer. It is always an indication for surgical intervention and imperatively demands immediate diagnosis. Perforation may occur in any type of ulcer, acute or chronic; at any age; at any time; with or without previous symptoms; with or without premonitory signs.

In abdominal diagnosis it is essential to distinguish the two types of pain that are exhibited most frequently in gastrointestinal pathology. The first type of pain is that of "colic" and the pain of colic is intense, sudden, acute but always intermittent, with intervals of complete relief from suffering. It is ordinarily the result of an irritative and functional lesion and is due to hyperactivity of non-striped muscle fibers with spasm. The second type of pain is acute, sudden, intense and always constant, with no intervals of relief. This type is due to actual inflammation of the peritoneum and is the result of perforation and exudation. In the beginning this latter type of pain is localized to the area of exudation; later it becomes more general and extensive. It is always associated with a fixed, tense, immobile body posture in contrast to the restlessness and movement in "colic." In these outstanding points of pain differentiation, we have the key to the diagnosis of acute perforation of the gastrointestinal tract. In perforation of a peptic ulcer pain is the outstanding symptom, abdominal rigidity the most distinctive physical sign, and immobility of body posture the most noticeable feature. Time does not permit of a laboratory test, nor are the available laboratory data of any noteworthy importance in arriving at the diagnosis in the early stages.

The pain of perforation is equaled by few and excelled by no other abdominal condition. The onset is sudden like a bolt of lightning, constant after its appearance, agonizing, unbearable, without any intermission of free intervals as in colic. The pain is made manifestly worse by the slightest movement, and as a result the patient remains in a fixed, tense, immobile posture, usually on his back, with knees flexed. There is not only a disinclination to move but a fear of changing the position, so greatly does bodily movement aggravate the pain. In the beginning the pain is invariably upper abdominal, but rapidly spreads over the entire abdomen. There is a generalized abdominal tenderness which is present almost simultaneously with the onset of pain. The abdomen is rigid to a degree unequaled by any other abdominal condition. The muscles are board-like and retracted. The rigidity is complete and absolute, and does not lessen or abate until death is imminent. The intenseness of the abdominal rigidity is uninfluenced by the will or relaxation upon the part of the patient. With the progressive development of peritonitis, there will be intestinal distention and a lessening of the abdominal retraction, but no relaxation in the intense rigidity. In the beginning the rigidity may vary in some degree in different portions of the abdomen. The most exalted sensibility of the peritoneum is in the neighborhood of the perforation, and hence the greatest pain and tenderness are exhibited beneath the upper right rectus muscle. Gentle palpation usually reveals that the greatest degree of rigidity is also in the same area. Percussion of even the lightest kind is painful and resented.

Cancer of the Stomach. This usually appears clinically in three symptom groups: the first group, approximately 60 per cent, in which the individual has a history of repeated attacks of symptoms that are not unlike those of ulcer of the stomach and finally has an attack or exacerbation from which

he does not respond to treatment and therapy that heretofore has been availing; the second group, approximately 30 per cent, in which the individual has a typical first attack of gastric distress which is diagnosed as ulcer but which does not respond to the ordinary forms of ulcer treatment or therapy; the third group, approximately 10 per cent in which the patient, suddenly acquires a distaste for food, vomits material that contains blood or coffee ground material, and develops a rapid and progressive cachexia. Any individual who has been free from stomach trouble and then at thirty-five or forty begins to lose his appetite, and have a variety of minor digestive symptoms should be suspected of having a carcinoma. The early use of the roentgen ray is of incalculable value in the diagnosis of cancer.

Anal Lesions. The early removal of anal papilloma is again a point in the prevention of epithelioma of the anus. One-third of the cases of carcinoma of the rectum have been operated upon at some time for hemorrhoids. The fact that a man has hemorrhoids and is passing blood is not sufficient to allocate the source of hemorrhage to the hemorrhoids. Ninety per cent. of rectal carcinomas are within the range of the palpating finger, particularly if the patient stands on his feet with the abdomen partially flexed and presses down, and almost all rectal tumors are within the view of the sigmoidoscope. With the remarkable improvement in electrically lighted instruments for diagnosis there is little reason for neglecting the rule that every case of rectal hemorrhage should be sigmoidoscoped. The technic is easily acquired, is not painful, and adds greatly to our diagnostic resources.

Fistulas, particularly those about the rectum, should receive early surgical intervention, as in the early stage the fistula is direct and adequate surgery makes for prompt and complete cure. Delay means extensive burrowing through the soft tissues and eventually requires more extensive surgery.

Hernia. The early recognition of hernia is of the utmost importance. Epigastric hernia may simulate the symptomatology of gastric ulcer and is to be differentiated from the gastric ulcer syndrome by the fact that the symptoms almost invariably cease when the patient assumes a recumbent position. Small herniae, beginning in either the inguinal or femoral region are often the causal factor of chronic persistent, localized pain and the hernial orifices of the anterior abdominal wall should always be palpated when the patient complains of sudden, acute, abdominal pain. It is essential that the practitioner recognize inguinal hernia and distinguish clinically between the direct and indirect type. The indirect hernia occurs in the muscular individual, follows the course of the vas deferens and finally appears in the scrotum. The direct hernia occurs at a much later period of life, usually after forty, in individuals who are obese, show muscular degeneration or atrophy, or have prostatic or rectal obstruction, and the "rupture" always appears as a bilateral bulge above and on either side of the symphysis. It is a good thing to have all herniae temporarily controlled by a truss and to recommend surgical intervention when the rupture is small and before there has been a wide muscular separation with atrophy of tissue. Surgery early is almost without danger and with scarcely any danger of recurrence. The mortality of herniotomy is the result of its complications and no person with a rupture is free from the possibility of incarceration or strangulation. Furthermore, the longer a hernia exists the less likely it is to be restrained or retained by a truss. It is well to remember that a hernia whose contents have been outside of the abdomen for many years may on occasion become obstructive and that in the presence of the signs of intestinal obstruction in a patient who has not had a laparotomy one should look carefully for signs of incarcerated hernia. This is particularly true with femoral

hernia, where the protrusion may be small and not necessarily tender or painful.

Varicocele. The early recognition of varicocele and the application of a suspensory bandage with regulation of the general hygiene of the patient will do much to prevent the development of the neurasthenic symptoms that are so often in evidence in these individuals.

Circumcision. The Hebraic rite of circumcision is not employed as frequently as it should be. There is no sane and sensible objection to its employment and the circumcized individual is less susceptible to venereal infection and certainly to chancroidal infection than the non-circumcized. It will do much to prevent the early development of masturbation in the male and has everything in its favor in the way of hygiene.

Industrial Surgery. The extension of our knowledge and skill in plastic and functional surgery has made it possible to accomplish splendid results in the most diverse conditions. Bone replacement, tissue transplantations, and the many aids to reconstructive surgery should be considered as a means for making the individual more efficient and a more competent wage-earner. Closely identified with this viewpoint is the increasing necessity for adequate surgery in industrial injuries. There are over 4300 different industries in the United States, most of them associated in some way or other with machinery and instruments capable of injury. The various state laws are concerned with the prevention of trauma and injuries but it is the duty of the medical officer to provide the proper first aid treatment and to canvass the ways and means for minimizing the danger of disability.

In all painful wounds the giving of morphine in sufficient doses to control pain is an outstanding measure to lessen exhaustion and the development of shock. To control hemorrhage tourniquets should always be used with great caution.

Their injudicious application brings with it the possibility of gangrene, paralysis, or contraction. The tourniquet is best applied only for a very limited period and for distinctly emergency use. A tourniquet or encasing bandage of any kind too tightly applied above the upper arm may result in musculospiral paralysis and Volkmann's contracture, and above the upper portion of the fibula in "drop foot." The first and immediate effects of severe hemorrhage are due to the loss in fluid volume rather than in cells or a loss of oxygen-carrying capacity. Therefore the first surgical indication is the replacement of body fluid by all agencies at hand. In perforating, penetrating, or lacerated wounds it is apparent that the free flow of blood does much to wash out the wound and prevent infection.

Infections and Injuries of Joints. As most of the members of a community are wage-earners the early recognition of infections and injuries in or about joints should receive the most solicitous attention and care. Whenever a joint is injured or infected it is imperative for the attending physician to place the affected part in the best functional position. If a person has an infection of the knee which might result in an ankylosis it is certainly better that ankylosis, if it must occur, should do so in a position of extension or possibly ten degrees of flexion than to have a fixation of the knee joint at a right angle. In the former the patient is capable of walking and sustaining his weight with the injured extremity while in the latter position further corrective surgery will be required. It is axiomatic therefore to place all joints that are affected or injured in the position of greatest functional usefulness irrespective of the result that is to be obtained.

Probably in no field of surgery is there greater opportunity for the utilization of corrective and preventive measures than in infections of the extremities. When one considers the subsequent deformity of the hand as a result of widespread

infection together with the loss of the economic status of the wage-earner through manual disability, we have a fruitful field for the early application of sound surgical principles when confronted by infections of the fingers, thumb, and hand, or leg. The physician should assume that every infection of a member is potentially a disabling condition and endeavor to provide adequate surgical drainage through ample incisions properly placed.

It is well to note, in infections of bursæ, such as the olecranon, the prepatellar, the first metatarsal, that drainage is insufficient as these conditions require excision for their cure.

Varicose Veins. In a general way, there are two types of varicose veins, those that are found as a fine, thin network, always superficial, and which usually give no trouble, and secondly, those that are represented by tortuous, dilated, grape-like clusters, along the course of the internal or external saphenous vein. The latter are prone to ulcerate and when this occurs it usually does so at the junction of the lower and middle thirds of the legs, complicated by a chronic edema, keratosis of the skin, and remarkable chronicity. As a preliminary measure the proper application of adequate bandages will help the condition. Final cure depends upon surgical extirpation or injection of the tortuous veins. Warning the patient as to the dangers of trauma to the legs with the development of ulceration, together with the early institution of surgical measures, will prevent many of the prolonged and disabling concomitants that go with this condition.

Ulcers of the Leg. The ulcers of the leg due to lues usually occur in the upper third and are noteworthy in the fact that when the ulcer recurs it never does so in the scar of the previously healed luetic ulcer. Varicose ulcers almost invariably recur in the area of a previous ulceration.

Disabling Affections of the Feet. The early recognition of perforated ulcers of the feet, whether due to metabolic, trumatic, or spinal-cord disease, is of importance. Neglect of the etiologic factor in perforated ulcers may mean the loss of a foot or the occurrence of infection with its devastating results to the leg. Gangrene, irrespective of its cause, should be treated as one of the most serious of all complications. Where possible the attempt should be made to keep a gangrene dry or to convert a moist gangrene into a mummifying or dry gangrene. Gangrene of and by itself is dangerous, lethal, and destructive; when infection is superimposed all of the untoward possibilities are increased to a surprising degree.

The wearing of improper shoes with the gradual development of bunions and hallux valgus with the associated mechanical defect of the foot for walking produces a severe degree of crippling. Further, the correction of an ingrowing nail, by a minor operation suitably performed under local anesthesia, corrects a painful foot and prevents a greater degree of infection.

About 70 per cent of unselected school children show evidence of faulty posture and bony alignment. The early correction by proper exercises will do much to develop the muscular apparatus sufficient to carry the body in proper postural alignment. The examination of the feet, the prescribing of proper shoes along the broad last type, with straight inside line of the Army shoe, will prevent the graver deformities of the feet, such as flat foot, bunion, hallux valgus, hammer toe, and that indefinite condition called Morton's neuralgia.

Gas Gangrene. In all wounds that are perforated, lacerated, or crushed, with or without fracture, there is the possibility of the development of a gas gangrene infection due to *Bacillus welchi* or other anaerobic bacteria. Within a few hours after the receipt of the injury there are local swelling, edema, and a peculiar bronzing of the tissues with a hemor-

rhagic exudate. Shortly there appears a watery discharge, with foul odor very similar to that of decayed meat, and crepitation can be detected in or about the area of the wound. The treatment should be instituted early and involves extensive excision, débridement en masse, with or without amputation of the part, and it is well to give from 80 to 100 c.c. of anti-gas serum (Mulford).

Tetanus. The early diagnosis of tetanus is of the greatest importance as all the evidence accumulated goes to show that the chances of successful treatment diminish rapidly as the length of time increases after the first symptoms have been observed. As short a time as possible should be allowed to elapse before the diagnosis and commencement of active treatment. Experience has shown that the best results from treatment are obtained with large doses of serum. The object is to saturate the body with antitoxin as quickly as possible and to maintain the saturation. It is of vital importance in a case of developed tetanus, that a large dose of antitoxin be administered at the earliest possible moment and in such a manner as to reach the spinal nerve centers as quickly as possible. The first injection, should therefore, be made into the spinal canal. A lumbar puncture having been performed in the usual way, preferably under an anesthetic, 3000 to 5000 units of antitoxin, heated to body temperature, are allowed to run into the spinal canal by gravity. In order that the antitoxin may be distributed throughout the length of the cord, it should, if necessary, be diluted with sterile saline to a volume of at least 5 c.c. An intravenous injection of 10,000 units should be given at the same time in order to render the blood highly antitoxic at once. The intraspinal injection may be repeated in twenty-four hours and again in forty-eight hours, but a third dose is probably unnecessary. A subcutaneous injection of 5000 units may also be given on the fourth day to sustain the antitoxic strength of the blood. If for any reason the attend-

ing physician is not able to give an intraspinal injection, an intravenous dose of 15,000 to 20,000 units should be given. If this, too, is impossible rather than delay, the same dose or a larger one should be given intramuscuarly, several muscles being used, and arrangements immediately made to give an intraspinal and intravenous dose at the earliest possible moment.

The use of antitoxin does not do away with the necessity for thorough surgical treatment of the wound if it has not already healed. A wound in which tetanus infection is suspected should be incised freely, and foreign particles carefully and thoroughly removed. The wound should be treated thoroughly with tincture of iodine and covered with a loose wet boric acid dressing. The application of fuming nitric acid to a wound suspected of being infected with tetanus has been advocated and occasionally used. This produces extensive destruction and eschar but is effective. The same effect could be obtained by actual cauterization of the wound with an electric cautery. The most important consideration, however, is that the wound should be kept entirely open and no attempt made to obtain an approximation of tissue by adhesive plaster or sutures. Under no circumstances should it be closed surgically. It should be allowed to heal by granulation.

Rabies. There is an unmistakable increase in cases of dog bite rabies. The incubation period of rabies is upward of six weeks. Patients infected show marked mental change and clonic contractions of the tongue and pharynx. Whenever anyone is bitten by a dog, measures should be taken to make sure that the animal is not rabid. This can best be done by observing the dog. A rabid dog will show characteristic symptoms and will die within a week. In a suspected case of dog-bite shut the dog up and notify the health officer. He will have the dog examined, and if necessary, have it killed, and the brain examined for the characteristic changes of rabies.

Above all, do not kill the dog without the authority of the health officers, as by so doing all means of proving the presence or absence of rabies may be destroyed.

Should the dog be proved to be rabid, the persons bitten should undergo the Pasteur treatment. Recently the method has been modified and the potency of the vaccine increased, so that immunity is brought about after fourteen daily treatments, instead of twenty-one, as formerly. Since the period of incubation of rabies is usually thirty days, or longer, this gives ample time to observe the dog to determine the presence of rabies. If these precautions are carried out, the necessity of giving antirabic treatment on mere suspicion that the biting dog is mad will be avoided.

Diabetes. The factors underlying surgical intervention in diabetes are as follows: (1) a lessening of tissue resistance; (2) a low recuperative power; (3) the susceptibility to trauma; (4) a progressive and continuous arteriosclerosis with diminished blood supply. Whenever an infection occurs in the course of a diabetes there is an increase in the severity of the existing symptoms. Obviously any increase in the severity of the diabetes means a lessening of the tissue resistance with an extension of the infection resulting in greater tissue destruction. Infection complicating diabetes establishes a vicious circle. The surgical mortality in pre-insulin days was anywhere from 40 to 50 per cent and it was not an uncommon experience to have a minor surgical operation cause a patient to pass into coma. Furthermore, ether anesthesia had two vicious elements about it, an increase in blood sugar and an ether acidosis. With the inauguration of insulin therapy and ethylene or spinal anesthesia, the surgical mortality in diabetes fell to approximately 18 per cent. Infection complicating diabetes is the outstanding lethal factor, for while a diabetic may withstand his disease, the moment that infection is superimposed the patient is on the road to death.

It is an interesting observation that most of the patients with diabetes complicated by surgical conditions come to the surgeon primarily for the surgical trouble and the diabetes is discovered later as an underlying factor. These patients are usually fat, their diabetes is mild, and the hyperglycemia is an incidental discovery. We may therefore divide the cases of diabetes with surgical conditions into: (1) the cases that are not infected and require elective surgery—herniae and neoplasms; (2) the vascular cases that are not infected; (3) the vascular cases that are infected, and (4) the cases with extraneous infections such as cellulitis, carbuncle, abscess of the breast, cholecystitis, appendicitis, etc. The greatest factor of safety for a diabetic undergoing surgical intervention is the metabolic utilization of carbohydrates with or without insulin. By the giving of insulin we can be assured that the diabetic does metabolize carbohydrates, and the administration of carbohydrates to a surgical diabetic gradually lessens the operative danger and promotes prompt tissue healing. A useful working formula is that 1 gram of glucose is adequately metabolized by each unit of insulin.

In the non-infected vascular conditions of the extremities pain may be such an outstanding feature that amputation is recommended before gangrene appears. If on roentgen-ray study the vessels are visible it may be advisable to anticipate gangrene by adequate surgical intervention. Furthermore, it should be the object of every clinician to inculcate in the minds of the diabetic patients that the surgeon is really the friend of the diabetic and that surgery is not the last therapeutic measure. The diabetic can live with his diabetes and in the early stages the surgeon is capable of removing or curing the most pressing lethal factors in his complications.

Stetten in 1913, and before insulin, published a very noteworthy paper on the conservative treatment of gangrene in diabetes and we are still inclined to follow his teaching. So long as

the gangrene is dry or mummifying it is not a great menace to the patient. The moment, however, that it becomes moist then infection is bound to occur, and of all the roads to the mortuary infection in diabetes is probably the shortest and quickest.

A mistake that has heretofore been present in the treatment of diabetes is the giving of a high fat diet with the production of overweight. Fatty acids are oxidized into carbon dioxide and water, but in order to bring this about it isnecessary to have glucose available for the patient's metabolism. In many of our dietaries the only available carbohydrate was that portion which could be derived from the ingested protein, a quantity far too small to accomplish the purpose.

The emergency operations on diabetics should be done irrespective of the diabetes. There is greater danger in leaving a gangrenous appendix in order to treat the diabetes than to operate on the appendix and control the diabetes by immediate intensive therapy.

Most of the diabetic patients requiring surgery have elective conditions and it should be the object of the surgeon before operation to accomplish four things: (1) to bring about an absence of glycosuria; (2) to obtain a maximum diurnal blood sugar of less than 200 mg. per cent; (3) to secure an absence of acidosis, and (4) to provide an abundant fluid intake. In addition, at least 90 per cent of the diabetics requiring surgery are dehydrated as a result of: (1) the glycosuria, (2) the polyuria, (3) the fever, and (4) the sepsis. Their blood shows an actual anhydremia and therefore it is necessary to have a complete fluid intake equal to 3000 c.c. of water daily. Glucose up to 10 or 20 per cent may be added to the solution given by rectum and all the available avenues of intake (skin, vein, mouth, and rectum) should be utilized if necessary. The anesthesia should be spinal, regional, or ethylene. Finally, the surgery should be performed just the same as if the diabetes were non-existent.

CHAPTER VIII

ORTHOPEDICS

RUSSELL A. HIBBS, M.D.

THE opportunities of the practitioner in the prevention of disease pertaining to conditions in the field of orthopedic surgery are very great because it is he who, first seeing the patient, may bring to bear on the study of the case the means by which an early diagnosis may be made. This is the only time in the history of many cases when the application of adequate measures of treatment may prevent the development of conspicuous and crippling deformity, and save the patient from a life of invalidism.

In general, orthopedic surgery concerns itself with the bones, joints, and bursae, and the muscles and tendons which act upon them. It includes any physical defect that interferes with the effective and efficient condition of the mechanical framework of the body.

The prevention of joint disabilities rests upon the fundamental idea that the preservation of function in a joint must be kept constantly in mind and should be the chief object of all treatment. Since joints are affected by trauma, by infections, by the absorption of toxins, or as a late result of brain and cord disease, as in tabes, the proper aspect of preventive medicine is to hinder any or all of these factors from exercising themselves upon joint function. If ankylosis is found to be inevitable and cannot be prevented it is essential to maintain the joint in the position of greatest functional usefulness so that the later result will render the member as useful as is possible in its state of deformity.

Pott's Disease of the Spine. A large part of the resources of orthopedic hospitals and clinics are now used in an attempt

to correct deformities and relieve suffering that might have been prevented. A striking illustration of this is found in the disease known as Pott's disease, hunchback, or vertebral tuberculosis, conspicuous by the gross trunk deformity usually associated with it. While the development of this disease is insidious, the symptoms are definite and the roentgen-ray picture characteristic, so that it is quite possible to make a diagnosis early and before deformity appears. If modern surgical methods of treatment are then applied, the deformity may be prevented and the disease cured in a comparatively short time.

Tuberculosis of the Joints. In tuberculosis of the other joints an early diagnosis is more difficult. The roentgen-ray offers no positive aid and the symptoms, such as limitation of motion, "reflex muscle spasm," intermittent limp, slight pain, muscle atrophy, have been found in connection with other types of joint infection and other conditions, such as Legg's disease of the hip. Many cases of joint tuberculosis begin in the synovial membrane, the bone not becoming involved perhaps for years, so that we have no means, at the present time, of making an early diagnosis except by a laboratory test, which itself frequently requires an exploratory operation. To wait until the disease can be demonstrated as present by physical signs and the roentgen ray, is to delay treatment for many months or years and may well mean the sacrifice of the patient's life. It has been found from recent studies of joint tuberculosis that within a period of fifteen years, at least 25 per cent of any group of cases conservatively treated die, the majority of them from some form of tuberculosis.

Application of any one of the various methods of treatment without positive diagnosis, has led to much confusion in estimating their value and the long follow-up study of cases treated by the generally accepted methods leads one

to doubt their efficacy, especially in hip joint tuberculosis, and to the belief that in most instances the cases considered cured were amongst those suffering from less serious conditions, in which a mistaken diagnosis had been made.

Acute Suppurative Arthritis. One of the most difficult problems which is encountered by the orthopedic surgeon is the disability which so often follows an acute suppurative arthritis in early childhood, when treatment had been too long delayed owing to failure to have an early diagnosis made. No other instance offers a better illustration of the advantage of prevention over cure. This disease is not uncommon, and the joint most frequently involved is the hip. The history is very different from that of tuberculosis, the condition with which it is often confused. The symptoms are those of an acute illness with sudden onset, high temperature, acute pain in the joint involved, both on motion and on pressure, with an accompanying leucocytosis. The disease is rapid in its destruction of the joint and dangerous to the life of the patient. Early diagnosis and immediate drainage of the joint are imperative in order to obtain the best result.

Poliomyelitis. Until some means have been found to prevent infantile paralysis the profession will be confronted with the problem of preventing the deformities that often follow in its wake and diminishing the more or less serious handicaps to the lives of its victims. Much can be done in the prevention of disabilities of anterior poliomyelitis, or infantile paralysis, by early diagnosis and in the injection of the serum on immunized donors. (See chapter on Pediatrics.)

Application of means for the prevention of deformity should be instituted immediately, as deformity develops quickly and may hamper seriously the recovery of muscles temporarily paralyzed. When the use of muscles is again permitted, following the acute stage which demands absolute rest, proper protection should be given the weak muscles

by some form of apparatus and massage. These protective measures should be continued for about three years, the individual gradually resuming such activity as is possible. After this period more or less accurate knowledge of the permanent damage done to muscles may be ascertained and some estimate made of the degree of disability sustained, after which measures may be instituted for permanent relief. The means to this end are in the main operative and in most cases will correct deformity, prevent its recurrence, and diminish the individual's disability to the greatest possible degree, thus saving the necessity of wearing cumbersome, expensive, and ineffective apparatus.

Scoliosis. Lateral curvature of the spine, a serious and progressive deformity, is rarely seen by the orthopedic surgeon until the deformity has become gross and the opportunity is therefore lost to secure the best results from treatment. Lateral curvature of the spine is occasionally observed in the course of a routine examination. Minor degrees of scoliosis are frequent and probably without symptoms. In general, there are two distinct types of lateral curvature. The postural or functional, due to faulty posture and without organic changes, although long continued uncorrected functional scoliosis does induce bony and ligamentous changes producing permanent and organic changes.

The organic type of lateral scoliosis is associated with a generally lowered state of health and in severe form it follows infantile paralysis, rickets, empyema, or congenital deformities. The lateral curve is often double with rotation backward and the thorax apparently bulges backward with the deformity. This disease is of frequent occurrence. All such cases should have careful study as to cause, complete roentgen-ray record as to the degree of deformity, and check-up pictures at intervals during its progress. This is particularly important in childhood, the period when most

cases begin. The deformity may be very slight, but with the progress of growth may steadily increase, though without pain or any form of disability, until adult life is reached and the ossification of the vertebral column is complete. After this period pain and disability appear, increasing as age advances. It is obvious that the cases which have gross trunk deformities must show evidence of interference with the functions of the organs contained in the thoracic and abdominal cavities as well as a lowered physical well-being and a shorter duration of life. It is well known that resistance to respiratory diseases in these cases is very low. The most frequent causes of this deformity are developmental defects of the spine and infantile paralysis.

Congenital Dislocation of the Hip. Results in the treatment of congenital dislocation of the hip are still unsatisfactory. This is due in most instances to the fact that diagnosis is not made early; treatment is therefore delayed and the opportunity for securing the best results is lost. Diagnosis is practically never made until the child walks, rarely before the third or fourth year and sometimes later. It may, however, be made at birth or soon after and proved by a roentgen-ray picture. It would seem reasonable to expect that every child should be examined by the physician for this condition at the time of birth.

Club-foot. Congenital talipes is a condition that is present at birth and about 80 per cent of these cases are of the variety known as talipes equinovarus, in which the foot is pointed downward and inward. This condition is bilateral in about 50 per cent of cases and should be recognized immediately after birth. If treatment is instituted at once and carried out, prevention of crippling is assured, but if the deformity is neglected it increases in extent and becomes permanent. The treatment of congenital club-foot, a deformity long known and easily diagnosed, is still in

many instances too long delayed, and therefore the opportunity for obtaining the best results in treatment is sacrificed. This delay is often due to the conviction on the part of the physician that the treatment is too severe for a new-born baby. This is a mistake; the treatment is not severe and when properly applied will not disturb the child inordinately. More may be accomplished in the first few months of life in the correction of this deformity than at any other period.

Torticollis. In a similar manner the early recognition of wryneck is imperative; this condition is ordinarily noticed only about the time the child begins to walk. In its earlier phase the condition is simply a contracture of certain muscles; later on it induces asymmetry of face, neck, and shoulder with permanent bony changes in the spine. It is ugly and deforming, and economically a crippling disability. It is the duty of the physician to recognize this condition early and advise the division of all contracting muscle fibers and maintain the head and neck in proper position an adequate length of time thereafter.

Rickets. The results of rickets contribute considerably to the number of orthopedic cases. It is preeminently in the field of preventive medicine that this condition should be recognized early, for by its proper treatment most of the orthopedic conditions associated with it will be prevented. (See chapter on Pediatrics.)

Birth Injuries. There are certain birth injuries which are seriously crippling, such as spastic paralysis due to intracranial hemorrhage, Erb's paralysis due to injuries of the brachial plexus, and torticollis. A more careful obstetric practice might prevent some of these injuries, but failing this, early treatment is essential. These conditions are rarely cured spontaneously or outgrown, but many instances are seen where children have been deprived of treatment because of this hope, greatly to the detriment of the patient.

Osteomyelitis. This is a serious condition, occasionally associated with death, and always with extensive bone destruction, prolonged ill-health, repeated surgical intervention, and varying degrees of crippling and deformity. It usually arises from a metastatic infection that has its origin in a focus of infection at some remote part of the body: tonsils, teeth, ear, or a furuncle. The offending organism is most frequently the *Staphylococcus aureus* and the incidence of disease, while it may occur at any age, is more usual in children between the ages of two and ten. There is a certain predisposition for localization. The following parts of the body represent the incidence of localization: (1) the upper end of the tibia; (2) the lower end of the tibia; (3) the lower end of the femur, and (4) the upper end of the humerus. If the infecting organism is a streptococcus, the osteomyelitis is usually associated with a septic arthritis of the adjacent joint. This is not ordinarily true of infection with the more frequent agent, *Staphylococcus aureus*, for in the latter the epiphysis is seldom penetrated and the nearby joint is not infected. Outstanding in importance in preventing this condition is the necessity for the proper treatment of all points of pyogenic infection. The trivial furuncle, the chronic tonsillitis, the discharging ear, and more rarely abscessed teeth, should be treated as serious, and thereby lessening the possibility of more remote disease. The early recognition of osteomyelitis when it does occur is of outstanding importance. The history of a well child, suddenly prostrated with fever, with swelling in or about a joint, with periarticular thickening, and pain in the region of a bone end, together with a history of a previous infection and with the clinical sign of pain on pressure over the epiphysis, which increases in intensity the longer the pressure is applied, is so strongly suggestive of beginning osteomyelitis as to demand early surgical intervention.

Faulty Posture. The physician should be on the lookout for faulty posture. Faulty posture uncorrected means permanent deformity and varying degrees of crippling. Anthropologists divide the human species into two significant and well-recognized types: the short, stocky, fat type, sometimes called the herbivorous type; and the long, lean, lanky, thin kind, sometimes called the carnivorous type. The latter, in childhood and adolescence, are more prone to curvatures, strains, scoliosis, and other defects of faulty posture. Early recognition is essential if these conditions are to be prevented.

Foot Disabilities. In adult life, experience indicates the increasing number of motor disabilities due to foot strain, flat feet, and bunions. Many of the conditions of foot disability in later life are due to faulty posture or to the wearing of ill-fitting shoes in childhood. The early recognition of a beginning flat foot, a breakdown of either the longitudinal or transverse arch, may often lead to correction by a change in the shoe or by building up the inner side of the shoe, thereby preventing the more grave deformity of hallux valgus, bunions, and calluses.

As methods of treatment for these conditions have improved, the fact is more generally recognized that the primary need is a surgical one, rather than the provision of homes for cripples. An evidence of the growth of this conviction is the development of many orthopedic hospitals and clinics which are to all intents and purposes surgical organizations for the purpose of utilizing every modern method in the study and treatment of diseases peculiar to this department. Conspicuous among the efforts in this direction is the work of the Mystic Shrine which has established orthopedic hospitals throughout the country.

The greatest service which the practitioner might render for the prevention of these crippling diseases cannot be

realized until our medical schools give their students a better and broader conception of these diseases and deformities, with a general knowledge of their early diagnosis and the principles of treatment. To do this would require better methods of teaching and more time given to the study of orthopedic subjects. In this way the time and special knowledge of the orthopedic surgeon might be fully utilized in preventing deformity, rather than in his being obliged to spend the major portion of his time, as he must under present conditions, in trying to repair damages that should never have occurred.

CHAPTER IX

OBSTETRICS

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THEORETICALLY pregnancy and labor are physiological processes which ought to be attended by no danger and followed by no disability. It is, however, one of the penalties of our civilization, of our aggregation into large communities, of our more or less artificial mode of life, that, in the absence of proper care and regulation, they may result in serious disaster to both mother and child. Even in primitive races there is an appreciable maternal mortality and morbidity and there is ample evidence to justify the belief that the pregnant woman is less resistant to the incidence of disease and that she is less able to fight it than the non-pregnant. Besides running the risk of developing some complication peculiar to the pregnant state the expectant mother is thus more liable to the ordinary infective diseases prevalent in the community and these, when acquired, are apt to run an unfavorable course. There is, therefore, great need that she be safeguarded in every way during the prenatal period.

A realization of the preventable nature of the majority of the diseases and complications of pregnancy and labor has come to the medical profession only in recent years. The late Dr. J. W. Ballantyne of Edinburgh was one of the first to call attention to it. In 1901 he published a paper entitled "A Plea for a Pre-maternity Hospital" and as a result of that paper a pre-maternity bed, known as the "Hamilton Bed," was endowed in the Edinburgh Royal Maternity Hospital. This was probably the first specific provision for the antenatal care of patients in any hospital. In the twenty-eight years since then great progress has been made in the

education of the profession and the public with the result that prenatal care has come to be standardized and practised among large sections of the population of every civilized community. When it becomes universal there can be no doubt that the maternal mortality and morbidity rate will be greatly reduced. That this reduction is not yet apparent in this country and that the maternal mortality rate is higher in the United States than in the great majority of civilized countries emphasizes the need for a more systematic and thorough study and practice of pre-natal supervision.

Pregnancy. *General Examination.* The supervision of the pregnant woman calls for nothing more than the use of the simplest clinical methods and laboratory tests. It must include a general examination of the patient as regards her nutrition and the condition of her heart and lungs. In the early stages of pregnancy, incipient or marked cardiac or pulmonary lesions will call for more detailed examination and may bring up for consideration the advisability of terminating the pregnancy. No decision can be come to in such cases without the most minute study. Pregnancy puts a great strain upon a damaged heart especially if there has been a previous breakdown in compensation. A previously compensated lesion may become decompensated during pregnancy or labor and, even without that, permanent ill effects may follow in later life. No general rules can be laid down for such cases. Each has to be considered individually and expert advice obtained if possible. The same applies to pregnancy complicated by a pulmonary tuberculous lesion; whether the pregnancy should be allowed to continue will depend upon the time at which the disease is discovered, the nature and extent of the lesion, whether it is progressing rapidly, and on the methods of treatment available to the patient. The important thing is its early recognition so that the patient may have the benefit of a carefully determined

line of treatment before the pregnancy has advanced too far.

A search should always be made for possible foci of septic infection, attention being specially directed to the tonsils and the teeth. If such foci are present they should be treated, for a latent infection may become active during pregnancy and especially in the puerperium with a localization of the causal organisms in some part of the genital tract or their dissemination in the blood stream. There has been and still is a very prevalent idea among women that no dentistry must be done during pregnancy as it may cause miscarriage or in some way affect the child, a survival of the old idea of maternal impressions. Women must be disabused of this notion and impressed with the added importance of having their teeth attended to during pregnancy. There are several cases in the literature in which sepsis, sometimes fatal, in the puerperium has been traced directly to a tooth abscess.

Given a patient physically sound, what supervision and advice does she require throughout her pregnancy in order that she may remain healthy and well? The first disability she is likely to suffer from is nausea and vomiting.

Vomiting. It is now generally recognized that the nausea and vomiting in the early months of pregnancy are not reflex as was formerly supposed but are due to a metabolic upset. Many women go through their pregnancy without experiencing these distressing conditions at all, others have them in a minor degree. It should be impressed upon women that anything more than a slight feeling of nausea in the morning is abnormal and that anything in the nature of continuous nausea or frequent vomiting should lead them to consult their medical advisor. When treated at this early stage control and cure of the condition are easy. Neglected, such cases may go on to the pernicious stage when nothing short of termination of the pregnancy is effective. By instruct-

ing the patient in the early stage to have a daily good evacuation of the bowels, to take frequent small meals, to abstain from fats and proteins in the diet, and to increase the amount of carbohydrates, the nausea and vomiting are controlled. In some cases rest in bed for a few days may be necessary. There can be no doubt that the early treatment of such cases would practically eliminate the pernicious vomiting of pregnancy and effect a great saving in maternal and fetal life. As a rule this danger is passed by the end of the third month, but the condition may persist throughout pregnancy or it may make its appearance only in the last three months.

Abortion. Premature expulsion of the ovum is most apt to occur in the first three months of pregnancy. One of the common causes is overfatigue and the patient must be warned about this. As a rule she may be allowed to carry on her ordinary activities, but anything in the nature of strenuous work or exercise must be prohibited. Syphilis is not such a common cause of early abortion as was formerly supposed. It is more apt to lead to the death and expulsion of the ovum at a later stage of pregnancy. In any case of repeated abortion the possibility of syphilis must be excluded and if present it must be treated thoroughly before another pregnancy is permitted to occur. We frequently see cases of repeated abortion in which no causal condition can be discovered. In such cases rest in bed during the early months or rest in bed at the times when menstruation would have occurred, may tide the patient over the dangerous period. In other cases such conditions as retroflexion of the uterus, catarrh, or laceration of the cervix may be discovered; these lesions should be treated before another pregnancy supervenes.

Late Toxemia of Pregnancy. The pathological condition to which a woman is most liable after the middle term of pregnancy is toxemia. This is not the place in which to discuss whether this is a specific disease or whether it may

be a manifestation of several different pathological states. From the point of view of preventive medicine the essential is to recognize the clinical manifestations, to investigate thoroughly, and institute early treatment. In most cases the earliest manifestation of the condition is the appearance of albumin in the urine. It is, therefore, essential that the urine of every pregnant woman be examined at regular intervals. As the likelihood of toxemia developing increases as the pregnancy progresses, those intervals should be shorter as time goes on: once a month for the first four months, once every two weeks until seven and one-half months, and once a week from then to full term.

Another early sign of toxemia is raised blood pressure. It is most important that the normal blood pressure of every patient be determined as early in pregnancy as possible. A blood pressure of over 130 in a young woman in the second half of pregnancy should be regarded as suspicious and when it shows a progressive tendency to rise beyond this it is, as a rule, indicative of a toxemia. A blood pressure of 140 systolic together with the presence of albumin in the urine is definite evidence of toxemia and calls for immediate treatment.

The patient should be instructed to report at once if she notices any swelling or edema in any part of the body. Slight edema of the ankles is not infrequent in the later months and may be due to pressure, but edema of the face, hands, or the abdominal wall indicates a constitutional condition almost certainly toxemic. The occurrence of headache, of visual disturbance, such as dimness of vision, flashes of light, or dark specks before the eyes, should immediately call for a thorough examination of the patient as regards her urinary output and her blood pressure. Another important symptom is epigastric pain.

The occurrence of all or any one of those symptoms and signs should at once warn us that toxemia is threatening or

already present, and treatment should be begun at once. Such treatment should include absolute rest in bed, daily evacuation of the intestine by the administration of magnesium sulphate enemas, and a low protein diet. If the case is thus treated early the condition usually rapidly clears up, the edema disappears, the blood pressure falls, the urinary excretion increases, and the albumin diminishes. If in addition to the symptoms and signs already mentioned there is distinct increase in the reflexes and the blood pressure is over 160 there is a probability that eclamptic convulsions are imminent. In such cases the recently instituted treatment by magnesium sulphate, 10 c.c. of a 25 per cent solution intravenously, gives good results; it reduces the blood pressure, seems to quiet the nervous excitability, and a general improvement in the patient's condition takes place. Success in averting the occurrence of eclampsia depends upon the early and thorough treatment of the pre-eclamptic state. The cases of eclampsia in which there are no prodromal symptoms or signs are comparatively few, but they do occur. There can be no question that if treatment were instituted on the first appearance of any warning symptom the incidence of eclampsia with its attendant maternal and fetal mortality would be enormously diminished.

Some of the patients who exhibit the foregoing clinical picture are not the subjects of true pregnancy toxemia but are nephritics or subjects of hypertension, the pregnancy being the determining factor in rendering these conditions evident.

It used to be the common textbook teaching that eclamptic toxemia was a condition which cleared up very quickly after the pregnancy was terminated and that it left no after-effects. This belief was founded on the rapid diminution in the quantity of albumin in the urine and, very often, its complete disappearance within a few days. With a more

thorough and prolonged follow-up of these eclamptic and other pregnancy toxemia cases, our views have been profoundly modified and we now realize that many of these patients suffer permanent ill effects and require very careful watching and treatment in the postpartum period and indeed for the rest of their lives.

I would call attention to a paper by Dr. W. W. Herrick and Dr. Jean Corwin.[1] They hold that "the late toxemias of pregnancy represent failures of a defective maternal cardiovascular-renal system to adapt itself to the strain of childbearing." They classify these toxemias as:

1. Acute convulsive toxemias (eclampsia).

2. Nephritic toxemias marked by long-continued albuminuria or relative nitrogen retention.

3. Hypertensive toxemias, characterized by hypertension without marked albuminuria.

In a follow-up of 201 cases, coming under these categories, in the Sloane Hospital for Women, they find that "hypertension persisting for months and years was present in one-third of the cases of eclampsia, one-half of the cases of nephritic toxemia, and two-fifths of the cases of hypertensive toxemia. One-half of the nephritic group showed marked albuminuria in the follow-up period."

Bunzel, in a previous study in the same hospital,[2] found in a series of 133 cases of late pregnancy toxemia where a complete follow-up had been possible, that 37.6 per cent showed persistent hypertension and that 30.8 per cent had albuminuria of some degree; 54.2 per cent showed renal insufficiency by the phenolphthalein test, and of those with retinal changes during their pregnancy 31 per cent had persistence of them. These findings collectively gave a percentage of 41.4 per cent with signs of permanent

[1] Abstract in *Bull. N. Y. Acad. Med.*, Feb., 1927.

[2] *Amer. J. Obst. & Gynec.*, 7: 686.

cardiovascular-renal disturbances following on pregnancy toxemia. Other observers have published very similar results.

It is unnecessary to enter into any discussion as to what these late pregnancy toxemias really are, whether there is a definite entity called eclampsia which differs etiologically from the other forms of toxemia or whether it is merely a late stage of the latter. For our present purpose it is sufficient to realize that all are liable to be followed by permanent structural and functional changes which may materially affect the health and life of the patient.

These patients require very close supervision and treatment by one skilled in such cases. Most of us as obstetricians are not capable of undertaking this and should have the cooperation of the internist. This is especially necessary when the question of future childbearing arises. We can no longer accept the old textbook statement that the patient who has had eclampsia in one pregnancy has only the general average liability to it in a subsequent one. Many of them do go through future pregnancies without convulsions, but the majority show some signs of toxemia. Thus Herrick and Corwin found that in 9 out of 13 such cases observed there was marked toxemia in the following pregnancy. Young[1] found that out of 47 cases of eclampsia 6 had had convulsions in previous pregnancies.

In the subsequent care of all toxemia patients the question of further childbearing is one of the greatest difficulty. Where there are permanent after-effects on the cardiovascular-renal system there is not only the danger of further damage, if the patient again becomes pregnant, but there is a possibility that she will undertake this risk without the compensation of bearing a living child. Herrick and Corwin in the Sloane series found that the fetal mortality in pregnancies following

[1] *Edinb. M. J.*, 34: 64, 1927.

on eclampsia was 30 per cent, following nephritic toxemia 47 per cent, and following hypertensive toxemia 15 per cent.

It is thus evident that every patient who has exhibited any of the signs and symptoms of toxemia during pregnancy should have a careful watch kept upon her in the immediate and remote postpartum period; and the advice we give her with regard to future childbearing must be based upon the known facts and upon a careful individual study of her case. If she becomes pregnant again the most careful antepartum care is necessary if her health is to be conserved and the chances of her bearing a living child increased. At any time the latter may have to be sacrificed for the former.

Antepartum hemorrhage may be due to the separation, partial or complete, of a normally situated placenta (accidental hemorrhage) or to the separation of a placenta situated somewhere in the lower segment of the uterus or cervix (placenta previa). The former is often associated with a late pregnancy toxemia and the only means of prevention we know of is to treat that condition. There is no means of preventing a placenta previa, but there can be no question that the mortality from both conditions would be materially reduced if every patient with bleeding during the later part of pregnancy were admitted at once to a hospital so that the proper means of delivery could be determined at an early stage and carried out under proper conditions. The great majority of deaths from these conditions occur in patients who have had severe hemorrhages and have been treated in their homes or admitted to hospitals only after considerable blood loss.

Statistics show that the maternal death rate from placenta previa is in the neighborhood of 10 per cent. Any condition with a mortality so high should be regarded by the profession more seriously than is the case now, and all patients with it should be hospitalized. The same applies to accidental hemorrhage.

Labor. In the passage of a normal child through a normal pelvis at full term practically no traumatism results to either mother or baby. If the presentation or position of the child is abnormal there may be difficulty and delay in the labor necessitating artificial interference with consequent damage to the soft parts of the mother and to the child. It is, therefore, very important in the last two months of pregnancy frequently, by abdominal palpation, to determine exactly the way in which the child is lying. If the breech is presenting an external version ought to be performed and the presentation converted to a cephalic one. In the great majority of cases this manoeuvre can be carried out easily and successfully; in a certain number it will be found to be impossible. An attempt should be made in every case, especially in the primigravida. An occipito-posterior position in a vertex presentation can be converted into an occipito-anterior by the application of a pad to the flank of the patient on the side to which the back of the child is directed, this being secured by a tight abdominal binder which the patient wears constantly. Very often within twenty-four hours the back of the child is rotated to the front of the mother and the head engages in this position. By those two simple procedures in the prenatal period what would otherwise have been difficult deliveries are made perfectly easy.

Pelvic Measurements. The irreducible minimum which every patient is entitled to from her attendant is that he satisfy himself that she has a pelvis of normal size and shape. The measurement and typing of the pelvis should be done certainly before the seventh month of pregnancy. The taking of these pelvic measurements is very easy. With a simple pair of calipers the interspinous, intercristal, and external conjugate diameters are measured and with the two fingers of the right hand placed in the vagina, the diagonal conjugate is ascertained; from this the true conjugate of the brim

can be estimated. With these four measurements the size of the diameters and the general configuration of the brim of the pelvis can be obtained. The outlet diameters can be similarly gauged. With measurements within the normal limits anxiety regarding the possibility of natural delivery is removed. With measurements markedly small, cesarean section will be indicated. The operation can then be performed at the time of election with a minimum of risk. It is in the borderline cases of pelvic contraction that the greatest saving of maternal and fetal life will be effected as a result of systematic pelvic measurement. These are the cases which in the absence of this measurement are allowed to go into labor and when delivery does not occur are subjected to attempts at forceps extraction, sometimes with the birth of an undamaged living child, or with the birth of a living child with grave cranial injury, and frequently with the birth of a dead child. Or, forceps delivery failing altogether, cesarean section may be undertaken with a tremendously increased risk to the mother as compared with that attending the operation performed at the time of election. In those minor degrees of pelvic contraction it is essential to keep a careful watch over the patient in the last two months and by abdominal and bimanual palpation determine whether the head is likely to pass through. The choice is then open for the induction of a premature labor, the continuance of the pregnancy to term with natural delivery, or the performance of cesarean section at term. In this connection also should be mentioned the importance of careful examination of all women who go much beyond the estimated date of labor to determine the relative size of the fetal head to the pelvis. Many a child is lost and many a mother's life endangered because of the neglect of this precaution, consequences which could be averted by an induction of labor before any disparity occurred.

Conduct of Labor. When prenatal examination has shown that normal delivery is likely there should be the minimum of interference during the actual course of labor. It goes without saying that the fewer examinations made on the parturient woman the less the danger of sepsis. Rectal examination has been advocated instead of vaginal, but even rectal examination is not free from danger in these cases where potentially pathogenic organisms are present in the vagina, for in the examination the vaginal wall is pushed up through the cervix and the organisms may thus be directly introduced into the uterine cavity. With the acquisition of greater skill in, and the appreciation of the value of, abdominal palpation, internal examinations of all sorts will become fewer and fewer. Abdominal examination at the beginning of labor reveals the fixation of the head and the exact position of the child. As the second stage progresses descent can be followed until the head is no longer palpable. Very soon after this the pelvic floor begins to bulge, and the progress can be followed visually. The ideal way in which to conduct labor is to make no vaginal examination at all, or to make only one, just after rupture of the membranes, to exclude such an accident as prolapse of the cord. If the patient's pelvis has been measured and a vaginal examination made in the later months of pregnancy, and if the head is presenting and fixed at the beginning of the labor, there should be no necessity to do more. To make vaginal or rectal examinations, simply to satisfy our curiosity as to how things are progressing, is not justifiable. With vaginal examinations during delivery reduced to a minimum and, when necessary, made with the greatest aseptic care; with the avoidance of unnecessary interference with what would be a normal delivery if left alone; and with the careful planning of obstetric operations, such as cesarean section when indicated by prenatal examination, the incidence of puerperal sepsis

would be greatly reduced. It would not be completely eliminated, for there can be no doubt that there are cases of autoinfection in which organisms such as hemolytic streptococci are present in the vagina during pregnancy. These may cause serious infection in the puerperium.

One other source of danger should be mentioned, viz., the possibility of the attendant harboring infective organisms in his throat or nose. We recognize this possibility and guard against it in surgical operations by the surgeon wearing a mask. It is just as necessary that the obstetrician and nurses be masked when they are conducting a delivery. In several outbreaks of puerperal streptococcal sepsis in hospitals the infection has been traced to this source.

Postpartum Care. Responsibility for an obstetric patient does not end with the birth of the child and the termination of the clinical puerperium, but extends throughout her life. As antenatal care is preventive obstetrics so postnatal care is preventive gynecology. Seventy-five per cent of our gynecological patients are suffering as the result of neglected obstetrical conditions. It is very necessary that every pelvic-floor tear be repaired immediately after delivery. But even in cases where this has been done or in which there has been no laceration the uterus may become retroverted in the puerperium. Every patient should be examined pelvically two weeks after delivery to ascertain the position of the uterus. If it is found retroverted it should be replaced and a pessary inserted. If this is worn till the sixth week the uterus will be kept in good position during the time of involution and will in all likelihood remain there. Normal involution of uterus and uterine supports cannot occur if the former is retroverted and the result is a permanent displacement. There is a prevalent idea that it is unsafe to replace a uterus and insert a pessary as early as the end of the second week of the puerperium. In the experience of the writer this is a

mistake. The early replacement and retention of the retroverted uterus diminishes enormously the incidences of permanent displacements and is attended by no danger.

Lacerations of the Cervix. In a labor which terminates normally there is seldom any deep laceration of the cervix. In a very precipitate first labor, or in one where delivery has been effected by forceps or by version and breech extraction before full dilatation of the cervix, a deep laceration may occur. Under such circumstances it should always be looked for at the end of the delivery and should be repaired when found.

Should a laceration with catarrh and thickening of the cervix be discovered at a later period, it should be treated by douching and the application of nitrate of silver. Should it not respond to those methods of treatment a repair or amputation ought to be done. If every cervix which required it were attended to in this way there can be little doubt that the incidence of cancer would be materially reduced.

Visceroptosis. One of the commonest disabilities from which the parous woman suffers is relaxation of the abdominal wall and visceroptosis. This causes a constant ache and drag in the lower abdomen and back. These conditions can be prevented in the great majority of cases during the clinical puerperium, by which is meant the two or three weeks following delivery. Whilst the patient is still in bed regular muscular exercises should be carried out. If in addition massage of the abdomen and legs can be given the result is so much the better. The patient should be encouraged to move about freely in bed and should be permitted and encouraged to sit up from the third day onward. From this time regular, graduated exercises should be carried out consisting in the alternate flexion and extension of the thigh on the abdomen, first one leg, then the other, then both together, and after the fifth day, the raising of the body from the bed with the

legs extended; twisting movements of the body whilst the woman lies flat on her back are also good. There can be no question that when such exercises are regularly carried out the muscles keep their tone so that when the patient gets out of bed she moves about more freely and with less distress than the patient who has not had them. Such exercises also help the involution of the uterus by accelerating the pelvic circulation and this in turn minimizes the danger of thrombosis and embolism. They also help to restore the tone of the pelvic floor muscles so that when the patient gets out of bed the still heavy uterus is better supported from below and has less tendency to prolapse or retrovert.

The length of time a patient ought to stay in bed varies in different cases; the average time should probably be about ten days, with a maximum of two weeks in the normal cases of which I have been writing.

When the patient begins to move about, if she notices a tendency to sagging of the abdominal wall and to backache, she should be instructed to continue the exercises for the abdominal mucles, and in addition she may require a temporary supporting corset. The time during which permanent impairment of the abdominal walls establishes itself is in the first two of three months following confinement. The patient is then apt, with the care of the child on her hands, to become anemic and flabby. It is most important that her daily life be supervised during this time. She is, or ought to be nursing her baby and we must see to it that this is not placing too great a strain upon her.

Nursing. It is now generally recognized that four-hourly feedings are best for the infant of average weight and that five feedings a day are sufficient. Every infant of average weight can be trained from the first two or three days of its life to sleep through the night from 10 P.M. to 6 A.M. without feeding. Such infants gain just as much and are as sturdy as those

who have six feedings in the twenty-four hours. The elimination of the night feeding makes a great difference to the nursing mother; she can have almost eight hours of unbroken sleep and this means much to the young primipara. When the patient remains anemic and tired it is well to begin to accustom the child to artificial feeding so that this may be substituted once a day, enabling the mother to get more fresh air and outside distractions than would otherwise be possible.

Prevention of Mastitis and Breast Abscess. In the great majority of women the nipples require no treatment during pregnancy. In a few where the nipple is retracted the patient should be instructed to pull the nipple out gently once or twice a day. The application of alcohol preparations to the nipple usually does more harm than good in that they render the surface of the nipple hard and dry and predispose to cracks and fissures when nursing has begun.

If a fissure should develop in the first few days of nursing, nursing from that breast should be discontinued and the fissure should be treated with a 40 per cent solution of nitrate of silver, applied to the fissure only, with a finely pointed orange stick. When healed nursing from that breast should be through a nipple shield for a few days. In the prevention of fissures and resulting infection of the breasts, the important thing is the careful sponging of the nipple with boracic solution before nursing and after nursing and the protection of the nipple from friction by the clothing.

If any hard, tender area appears the breast should be supported with a sling, nursing should be stopped from that breast, and the breast pumped if necessary. This together with the application of an ice bag will frequently abort an impending abscess. Should an abscess form, early and free incision should be made and drainage should be carried out.

Late Care. We do not always recognize what a great strain, often with permanent bad results, there is on the young primipara who before and during her pregnancy was active, athletic, and carefree, and who now has restriction of liberty, insufficient sleep, and added responsibility. Such a patient requires advice and direction. The gradual disappearance of the old-fashioned general practitioner is to be regretted if for no other reason than that this aspect of his work is so often neglected.

Space will not allow of further detail regarding the preventive aspects of obstetrics and gynecology. The whole matter may be summed up by stating that in obstetric work we must always have a long vision of the patient's future. With proper prenatal care there ought to be few obstetrical emergencies, few occasions on which we are taken unawares and are called upon to act in a hurry. Possible difficulties should be foreseen and planned for. Nothing so lightens the burden and responsibility of obstetric practice and ensures greater safety to the patient than the fore-knowledge which results from careful prenatal examination and study.

CHAPTER X

GYNECOLOGY

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PREVENTIVE Gynecology is a new field. Forethought and teamwork could abolish the greater part of those professional activities concerned with treatment of the disorders peculiar to women. Systematic prevention can rob gynecology of most of its surgery, surgery that constitutes one-fourth of major operations. Effective training in health habits and nerve balance, plus reasonable living conditions, can reduce the nine-tenths of gynecology that is office practice. The pediatrician begins the program by fighting malnutrition and infantilism. The school and college physician and the industrial surgeon have important fields in supervised activity and instruction on daily health habits. The obstetrician will take nearly the largest share by prompt repair of all tears, replacement of all retroversions, and duly prolonged follow-up. The family doctor, at routine premarital examinations, can forestall inhibitions, frigidities, physical maladjustments, and abortions due to undiscovered troubles, and may diminish the propagation of the unfit; he can also, by routine annual health examinations of older married women, lessen the number of deaths from cancer of the cervix and breast. The alienist curtails reproduction of mental deviates by sterilizing the insane and feebleminded who are fertile before sending them back to the family or to work.

Unless, or until, a perfect prophylaxis is developed, the chief share in prevention of pelvic infections still lies with the parent and minister, the teacher and trainer, so to build up character and self-control as to minimize indiscriminate intercourse, with its train of grave inflammations and stub-

born sterilities. Toward this consummation we devoutly wish that prosperity may bring early marriage to our aid.

As to a physiology of fecundity, the knowledge of what is normal in human sex activity, medical societies and institutions can, if they choose, find and gather together a body of facts now lacking, and thereby prepare to teach the profession what to teach. Then we shall have a hygiene of sex. Even now we can draw up some schedules of examination, of instruction, of automatic safeguards. These may be in type or speech, or, in their ultimate form, counsel to one person at a time. Text or talk or looking-over should be short, eliminating prolixity, repetition, and suggestiveness, and seeking to combine with directness delicacy, and with essential detail, decency and dignity.

Infancy and Youth. An inheritance of vigor, an environment of comfort, a discipline of sanity, a happy habit of work, have important effects on the reproductive function. All general hygiene counts. Bad hygiene may arrest development in the pelvic wall, as it does in rickets, or in the uterine wall, as it does in rodents. The poor of Paris, Copenhagen, and Germany reach puberty about two years later than the richer. Several of the pelvic disabilities of women are degrees of infantilism. Some amenorrheas and menorrhagias are due to hypothyroidism. And the excitements, late hours, and parasitism of the wealthy also carry penalties.

Vaginitis of children is one of the obstinate diseases favored by the overcrowding and defective bathing facilities of poverty. The most important measures of prevention lie in better living conditions and in the effective diagnosis and cure of gonorrhea in adults. The immediate measures are: regular testing of all children in institutions, and particularly of every applicant for admission, avoidance of mass bathing, the separate basin and towel and soap, the isolation of the infected child, and treatment and follow-up of every case until cleared.

School and College Students. The most systematic preventive gynecology can be done in youth in the secondary schools and colleges, where large numbers of girls may be controlled during puberty and adolescence. Here, direct instruction in hygiene can be practically applied in the daily work and play.

Traditionally the only item of gynecological hygiene observed generally was routine exemption from active exercise in gymnasium of field during all or part of the menstrual period. This reflected the older idea of menstruation as necessarily disabling, a time of sickness or "unwellness." The extreme instance was in certain fashionable boarding schools where every girl was required to spend the first day of her period in bed, getting up only for supper if she "felt able." This now fortunately unusual procedure would tend to foster a pelvic-invalid fixation in all but the most robust.

The present tendency, as expressed in current school and college practice, is quite the opposite, and toward encouraging girls and women to carry on their customary exercise, bathing, and other activities as a matter of course, save in the occasional cases with a real disability. The only exception is that athletic games or competitions involving emotional excitement or tension, as in school meets, are to be avoided. Extra care has been taken to insure girls in camp or at schools and colleges with keen athletic interests against overactivity during periods. The newer concepts are described in the "Handbook on Positive Health," issued by the Women's Foundation for Health, of New York City. This change in attitude resulted from experience and observation, but as yet there has been no formulation of principles based upon experiment or systematic follow-up of cases. However, college physicians and physical educators are beginning to study the relation of the menstrual function to general health and academic progress, and modifications are reported of the

older method of mass regulation, by adaptation of treatment to individual needs and conditions.

Thus, Barnard requires rest from *all* physical activities during one day of the period, the day chosen being the one of chief discomfort to the student. On two other days she may substitute a class of *remedial* exercises[1] for other physical activities. In cases of menorrhagia, excuse from gymnasium may be given for three to five days. For dysmenorrhea, a course of iron, ovarian extract, and the Mosher exercises has been found helpful, usually relieving the condition in three months. Here, as elsewhere, pelvic examinations are not made, the exceptional case being referred to a gynecologist. The college physician reports that only 3 to 5 cases in a thousand need such reference yearly.

The Wellesley physician cites as conditioning factors in dysmenorrhea too light clothing, which allows bodily chill, and insufficient rest, causing fatigue and nervousness. Some years ago, Dr. Kristine Mann made a comparative study of the menstrual history and habits of the girls accustomed to active daily exercise in the Wellesley College normal school of physical education and of the girls in the academic department, who had only the limited gymnasium work required of all students. The physical education students, who were of the same general racial, social, and educational background as the others, were relatively far freer from menstrual disorders and handicaps.

At Smith, where the medical department includes all the physical education work as well as health supervision and instruction in hygiene, a special study of menstrual conditions in relation to the general college life of each student is under way. Unless the student also has to be absent from the classroom, she must attend gymnasium and participate in the exercise, if not excused by the instructor, in which case she must watch the work and take notes. Persistent

[1] Devised by Dr. Clelia Mosher.

menstrual disorders are reported to the head physician who, if immediate medical care is indicated, refers the student to a town physician selected as a competent gynecologist. Otherwise a note is sent to the parents advising them of the condition and recommending examination by the family physician, who is asked to communicate with the college doctor. The head physician, with training in psychiatry, personally handles all students presenting nervous or mental symptoms relating to their menstrual difficulties.

Two observations of practical value have been made so far. First, while menstrual disorders are reported by only 5 to 10 per cent of the entering students, some form of trouble is found in half of those dropped for academic failure. Second, it has been found that the severe dieting undertaken by certain girls in order to "reduce" sometimes causes amenorrhea that clears speedily when a normal regimen is restored.

The later effects on childbearing of intensive muscular development of girls, in amateur and professional athletics and in teacher-training for physical education, have yet to be determined.

Teachers. The most recent bulletins on the teacher's health give no special attention to gynecological factors, though these must play a part in her efficiency. Health examinations before licensing are being inaugurated in some school systems, and the approved forms include routine reports on menstrual history and habits. Preventive work in this field would have to start and center in normal schools.

Women in Offices, Stores, and Factories. Dr. Harry E. Mock, in his book on Industrial Medicine (1919), makes the one extensive presentation of this particular field of preventive gynecology. The following is condensed from his book:

The practicability of examining girl employees has been demonstrated in a number of large industries throughout the country. Some concerns have employed women physicians

and subjected every girl to a complete examination from head to foot, while the majority require only partial examinations including head, neck, and chest. Careful history taking and questions usually reveal any abdominal or pelvic symptoms which call for more thorough examination. Consent of parent or relative should be obtained before making the pelvic examination, and then it should be made always in the presence of a nurse, and in the case of virgins, under nitrous oxide anesthesia. When one large industry which for three years completely examined every girl employee found that the number of pathologic conditions discovered only slightly exceeded those found by partial examinations elsewhere, they discarded the method, as it was very distasteful to the employees.

Among conditions occurring in both sexes, found by examining below the waist, are hernia, venereal disease, varicosities, and flat-foot. But a small proportion of these conditions is found in women; hernia, even the femoral type which is the commonest form in that sex, is rare. Venereal disease is often difficult to detect in women, and in the concern referred to the percentage found by complete examinations was small. Cases of syphilis were detected among the girl employees by finding mucous patches in the throat or a rash on the body. Varicose veins, rare among girls, are common among older women or among the married women who apply for work, but these do not object to examination of their extremities.

Headache standing first among 15,000 cases of absence, *dysmenorrhea* came second, making up 18 per cent. "When we consider the great number of girls who must rest for a few hours or slow up in their work for a day or two because of painful menstruation," says Doctor Mock, "we realize that this problem is one of great economic importance, causing an incalculable loss to all the concerns employing great numbers of girls." The majority of such cases are

traceable to conditions more or less remote from the pelvis. Of these, constipation, with its predisposing conditions, such as improper food or lack of exercise, is the commonest cause. A history of constipation was reported by 33 per cent in over 1000 consecutive records of working girls, and in 20 per cent it was habitual. A few years ago many state legislatures endeavored to improve health conditions among working girls by enacting laws making it necessary for them to sit while at work. Constant sitting during long working hours is as bad as, if not worse than, constant standing, the sitting posture causing more or less congestion of the pelvic organs, which is increased by the constipation so often associated with constant sitting. Under existing conditions, occupations which allow part time sitting and part time standing, or if this is impossible, frequent rest periods which allow the girls to stand and move about, will be found of the greatest benefit in overcoming dysmenorrhea.

The next commonest cause for this condition can be found in an unstable nervous mechanism. A large percentage of the girls who reported to the doctor's office because of painful menstrual periods also reported at other times because of various nervous manifestations. Questioning revealed that their ideas of the menstrual function were erroneous and misleading. For example, they had been told to keep quiet, not to bathe or exert themselves in any way, and in general to behave as though really ill. All this false instruction tends to develop fear and increase a neurasthenic state.

Doctor Mock reports that he has made vaginal and rectal examinations of girls whose dysmenorrhea could not be accounted for by any of the conditions mentioned, nor relieved by their correction. But even of these only a small percentage showed pathological changes which might account for the dysmenorrhea. Among these, acute retroflexion was the commonest finding, marked retroversion being next.

Backache is a frequent complaint, and often thought by the employees to be due to pelvic inflammation. Study, however, shows that the greater number of these are due to non-pelvic conditions whose correction relieves the backache. Judging from records of cures, common causes are badly diseased teeth, infected tonsils, flat feet, high heeled and other faulty types of shoes. Incorrect posture and sacroiliac strain are perhaps the most common direct causes. Seats which give maximal individual adaption are essential.

Every industry employing girls should provide means for healthful recreation, especially outdoor games. Lectures may prove of value, but better is a careful study of individual cases of dysmenorrhea followed by instruction in overcoming it. Nurses can give these instructions in the form of intimate talks with the girls. Hot drinks, especially those containing certain food values, combined with a short rest in the rest room, will enable many to return to work, whereas medicine given to relieve pain only tends to create a habit.

Dr. Cassius Watson says one bed in a rest room per 200 girls covers the need. For dysmenorrhea simple remedies like viburnum or sodium benzoate may be in the hands of the nurse. [The 5 grain dose of aspirin or phenacetin might be allowed–R.L.D.] If there is frequent absence at the period the names of three physicians known to be well posted in gynecology and accessible to her residence are given the employee.

Contagion in toilets is very rare. Employers may be asked to provide U-shaped seats open in front. Girls may be warned that contagion is possible only through soiled damp linen, and by using cups after persons having mouth sores.

Examination. Preventive medicine should establish automatic protections against criticism and animadversions. Such safeguards do not presuppose evil. They shield both

doctor and patient. Here are examples: In diagnosis and treatment, bodily exposures are to be limited in time and frequency to whatever is compatible with necessary thoroughness, and (especially in the case of vaginal examinations) nurse or husband, friend or relative will be present, or else beyond the partly opened door, whenever possible. With vaginal examinations there will be deliberately combined a small degree of discomfort or pain, in order to secure such association with the procedure. Measures will be selected which abbreviate local treatment; in cervicitis, for instance, the half-minute of fine electric cautery wire once in three weeks in lieu of the half-hour three times a week of diathermy. Office doors are without locks, whereas patients' histories are kept under lock and key. A high table is used for examinations, and not a low couch. Translucent glass in certain doors will show dim forms but not detail. The attendant is encouraged to enter freely, after knocking. Most important of all, women physicians should have charge of disorders peculiar to women, wherever their skill and jugdment and facilities equal, or can be made to equal, those of men.

Vaginal Examinations. In the health examinations of *unmarried women* vagino-abdominal bimanual palpation and speculum inspection are needed only where there is disturbance or suffering sufficient to disable, or considerably to interfere with everyday activities, or when symptoms fail to yield to simple remedies or to regulation of living habits and of bowel action. Pain is difficult to gauge. A girl may dance for long hours at a time when she professes herself unable to work or study. But absent periods, really scanty or profuse flow, sick headache or active backache or marked depression before or during menstruation, and mucopurulent or purulent discharge, dysuria, or very frequent urination, if persistent and not readily relieved, call for a local examination.

How simple this may be is generally forgotten. A bimanual examination with the protected finger in the rectum and the hand over the abdomen settles several questions. A mere glance at the vulva may suffice to show presence or absence of infection of the urethral glands or whether the hymen is stretched or is about the one-finger diameter. Such evidence will determine further steps. Further steps are needed, moreover, whenever there is a history suggesting the possibility of pregnancy or exposure to infection, or when a request is made for assurance of fitness for marriage or maternity.

Symptoms referable to the kidney and bladder are noted in the chapter on Urology. Every gynecologist should accustom himself to the simple child-size cystoscope for diagnosis in the case of an irritable bladder, and thus, while treating the other pelvic organs, he may recognize and relieve that most common disability, congestion of the trigone or upper urethra.

In *married women* leucorrhea calls for cure of its usual cause, cervicitis; menorrhagia and spotting toward the cancer years always call for study; and, childbearing having passed, an examination is due for cervicitis, and to learn whether repairs are required, since extensive later surgery for prolapse may be prevented by a pessary till involution or by some relatively simple plastic work.

Prolapse may be prevented by repairs just after delivery, by follow-up of subinvolution, by reposition and support of retroversions, and, in old women not needing to work or not good subjects for operation, by one of the rings or balls with a handle so that it can be removed by herself every night and thus will not chafe.

Retroversion without symptoms, in a small uterus without descent, is to be disregarded. After labor, examination at the second, sixth and twelfth weeks, with pessary support

for two to four months, or until the structures regain tone, will make the need for operation rare.

Salpingitis may be prevented or greatly limited by: (1) the utmost curtailment of curetting in abortion; (2) prolonging the rest period in active acute gonorrhea; (3) insistence on bed during the first three periods after gonorrheal infection; (4) avoidance of sound or medication beyond the internal os.

Fibroids should be detected early in their growth by routine examinations or by a search for them indicated early by excessive or painful menstruation. If the total mass has not grown beyond the size of a two and a half months' pregnancy; if there is no marked bleeding or pain on pressure, or foul discharge; if the condition remains stationary as shown by examination every four to six months, then nothing need be done, particularly if the menopause is not far off. Malignancy as a complication occurs in but 1 to 2 per cent. The submucous pedunculated fibroid bleeds and may be removed early by the vaginal route; those in the uterine wall may be arrested by radium or roentgen ray; before the mass arises out of the pelvis the *growing* subperitoneal and multiple forms will come to simple operation, and taken thus early, the uterus may often be saved by merely removing the growths. In operation done before the tumor is large, the ovaries can be left in the majority of women. Giles brings forward figures which he thinks show that childbearing lessens the likelihood of fibroid growth.

Prevention of Venereal Disease. A program to lessen indiscriminate intercourse involves codes of conduct, life training in decency and self-control, restriction of sex stimulus in books and plays, pictures and behavior, and limitation of opportunity by making contacts with prostitutes difficult. Diminishing the number of foci of infection requires follow-up of every infected individual and reporting to public health

authorities whenever treatment is broken off. Care of obstinate infections in women demands interest on the part of organized gynecology, which it does not take when it leaves vaginitis in children to pediatricians and cervicitis in prostitutes to urologists. It involves backing for such bodies as the American Social Hygiene Association, with its surveys and extensive teaching program, and for Committees of Fourteen with their methods of city clean-up.

The Prevention of Sterility has three aspects: (1) Building up of bodily vigor to forestall defects of development; (2) the combat against gonorrhea and prostitution; and (3) avoidance of any treatment which will carry infection beyond nature's main gateway of defence, the internal os. Under the *second head* it means reasonable assurance that the groom is really cured of any previous urethral infection. Under the *third* it means minimal use of sound or applicator or curette within the body of the uterus, particularly in the presence of an infected cervical canal, and avoidance of curetting for abortion whenever nature can be cajoled to empty the uterus. Salpingitis resulting from ascending infection with its tube closures should be prevented, as it is curable by surgery only about once in seven operations.

Prevention of Cancer and Cancer Deaths. Very marked betterment in our results is possible by healing of chronic irritations and by the early detection which permits of roentgen-ray treatment or complete removal. Health examinations should include a look for nipple irritations and palpation for irregular breast masses, particularly after forty, or when the history shows that mastitis or abscess followed childbirth.

As to the *cervix*, forty years of full notes and a recent study of 687 cervicitis cases leads me to urge the following routine: (1) Healing of every raw surface left after labor; (2) urging every former patient who has had children, or any woman, married or unmarried, who has had cervicitis, as she

approaches the fourth decade, to be examined to make sure that the inside of the canal and the vaginal portion are clear of chronic inflammation or granular areas.

One is in duty bound to secure a healthy surface between one baby and the next, by thorough cleaning and then applications of strong silver nitrate solutions (2 to 10 per cent) at five-day intervals, or of the nasal cautery electrode at three-week intervals until effective; then, after childbearing is over, to heal and keep healed such areas, or in the relatively few failures treated as above, to do plastic work such as a Sturmdorf operation. One-fifth of cervix cancers are in the unmarried and one-fifth of my cervicitis series were in the unmarried. Any irregular bleeding, particularly toward the menopause, any spotting between periods, or after intercourse or long automobile rides, calls for this examination. A polyp of the cervical canal can be seen; a fibroid can be felt; a raw cervix can be determined with a good narrow-beam headlight. In the absence of these findings, the curette alone can determine whether or not bleeding is due to a beginning malignant growth in the cavity of the body of the uterus.

Excess Surgery. Preventive medicine could limit avoidable and unskilful surgery by insistence on certain general principles:

(1) Operations only after consultation and recorded opinions, except in emergency.

(2) Operations only by those qualified by training, except in emergency.

(3) Hospitals to maintain a surgical audit on operations as faithful as their financial audit on expenditures.

(4) Review by professional staff of indications for and frequency of all graver operations as well as review of operative casualties and follow-up failures.

Unless organized medicine unites its forces to obtain these bona fide reviews, either within each institution or by some

authorized medical society, and covers all postoperative deaths and complications and indications for operation, the State will some day undertake such publicity as has happened in Sweden, with its striking results from simple methods.

Gynecology does take steps in surgical prevention, as, for instance, a technic to limit intestinal adhesions, standard methods of making and closing incisions to lessen suppuration and scar hernia, and the reduction of some grave hazards by condemning early and general attack on pus tubes. It also takes pains, wherever possible, to leave one or both ovaries and conserve the circulation so that persisting flushes and loss of sex feeling after operation may be reduced to one-fourth from the three-fourths following removal of both ovaries.

Gynecology can claim the outstanding example of surgical accounting undertaken to 'Ward" off all but the best work. It needs this spirit throughout to catch up with the preventive program of its sister, Obstetrics. Some day our chief business also will be to spoil our business.

Abortion and Its Sequelae. The spontaneous undesired emptying of the uterus (called "miscarriage" by the laity) is so often preventable as to be a responsibility for any physician in contact with a couple before or after marriage. He should give certain warnings at marriage about the need for early examination and for three months' care. He should examine before the second missed period, since women are seldom aware that there can be retroversion or anteflexion without symptoms and yet of sufficient degree to interrupt pregnancy. These, and defective development, can be detected in time. The backward displacement will be reposited and held on a pessary for three months. All these conditions will demand, and a normal pregnancy be safer for, a couch-and-wrapper week at the time when the first three omitted periods would have occurred. Automobile and train travel

are forbidden at such times, as well as cathartics, heavy lifting, and intercourse. In case of pain or show, these restrictions may have to be prolonged. Morphine should be provided, to be taken in case pain or stain appear, with orders to go to bed at once.

It is the doctor's responsibility to give warning of the dangers of blood-poisoning and invalidism and sterility and death from abortions done by unclean, unskilful, and unscrupulous men. (As to the skilled aseptic professional abortionists we have few data.) It is also our responsibility to save from the bunglers women whose requests have adequate reasons, and it is time for reputable physicians to protest against the intimidation that hampers legitimate and wise interruption.

In Russia every woman entitled to interruption is cared for without charge in a government hospital after her condition has been passed upon by a commission of three. In the first three years after this law was passed a sequence of 55,600 such operations were reported without a death. Russian physicians reply to the skeptical that the hospitals of other countries have not had their advantages in receiving patients in whom no attempt at abortion preceding admission had infected the uterine contents. The request was granted to 81 per cent of the applicants, that is, whenever the woman or her husband were shown to have diseases that endangered health or life, sanity or progeny; and among the very poor four or more children afforded adequate reason. A less complicated procedure of proof is contemplated so that wherever an accredited physician finds a further pregnancy with continuing disability his consent to hospital operation will suffice.

The Russian government has under advisement whether prevention is not wiser than repeated abortion. To test the matter it has for each of the last three years printed for

doctors very scholarly monographs on the technic of birth control, now issued in book form.

At Mt. Sinai Hospital in New York special attention has been given to the possibility of preventing some dangers in therapeutic abortion by the usual operative methods, and an experimental series of 60 cases aborted by roentgen ray has shown good results. If the development of the embryo is merely arrested, and spontaneous extrusion does not occur, a finger or forceps not higher than the internal os usually suffices to complete the clearance.

Control of Conception. To prevent breakdowns or to save patients with whom childbearing is a risk to life or health, control of conception has its place in the everyday practice of medicine under conditions like the following:

1. After the birth of each child, until the mother is well enough to begin with the next pregnancy, particularly when pregnancy or labor has been exhausting.

2. In convalescence from any considerable illness or operation until strength is recovered.

3. In chronic disease, as nephritis, cardiac decompensation, or tuberculosis.

4. In mental unbalance or defect.

5. In economic circumstances which produce physical conditions wherein freedom from childbearing makes the difference between persistent invalidism and sufficient health to carry on. (Application for advice in the birth control clinics here and abroad comes after the fourth child.)

In other words, whenever the doctor directs that pregnancy be postponed, his duty is to advise harmless, reasonable, and efficient measures, knowing that asceticism in marriage, or a brother and sister life, is not practicable with more than one in twelve couples, to judge by the Katharine B. Davis figures. He faces a certain duty of medical advice to such of the ten million fertile wives in the

United States as should postpone pregnancy. He warns against the two methods proved to be harmful, the intrauterine stem and the vaginal occlusive pessary when left in place more than two days at a time; and where the husband will not protect his wife, he places the protection in the wife's power. Ultimately, control of ovulation or spermatogenesis over considerable periods may be expected to overcome the handicaps of current methods.

When the doctor, upon consultation, directs permanent abstention from conception, *sterilization* is in order. For the male, vasectomy is without danger or aftermath, and necessitates only two or three days' absence from active work. For the woman who is feebleminded or insane, abdominal operation, to ligate and partly excise the tubes is practical in institutions, as she can be retained till her scar is strong. For the working mother of six who cannot spare three weeks for the hospital and three months from the wash tub, or for the woman with bad heart or lung or kidney that should not have ether, roentgen raying of the ovaries has a place, repeated if found insufficient. In time, closure of the intrauterine ends of the tubes by chemical or electrical cautery with visualization is promising, as it involves no loss of worktime.

Premarital Examination. Examination for fitness has become customary for most occupations but not for the most important of all, marriage and parenthood. Eventually common sense may be expected to sway public opinion toward routine consultation on major physical defects and inhibitions before the announcement of an engagement, followed by a general and local examination of both bride and groom a month or more before the wedding day is fixed. Instruction is then given regarding the differing psychology of men and women and on certain elementary physical matters, basic for the newly married, including the wise spacing of children. It works best to have the two guided by the same physician.

Inhibitions are to be looked for. Fear of suffering in childbirth calls for the promise of all possible alleviation. Shocks, or impressions of male inconsiderateness or sensuality call for explanation of the capacity for full responsiveness by the wife with tact and training, and instruction for adjustment of variations in desire or responsiveness between the partners. Each of us must develop such a plan of preparation so that none of our people shall be able to say later. "This unhappiness need not have come if I had only been told."

Prevention of Dyspareunia and Frigidity. An analysis of 4100 marriages among my records shows distress persisting in 1 marriage out of 25, one-fourth of these psychic, and none due to roughness. Nineteen virgin wives with obstruction to entry after one to twenty years were seen in 1 out of 250 couples. A hymen of virgin type that is thin, sensitive, and admitting one or more joints of the gloved male forefinger, may be rendered elastic and insensitive by a few days of hot douching and self-stretching, to prevent association of pain with early entry, to forestall vaginismus, and lessen the frigidity now too frequently developed in women with reasonable capacity, that is with 90 per cent possibility of response. A thick and inelastic hymen should be nipped with scissors, under novocaine-adrenalin, ten days or more before marriage to allow the cut surfaces to heal over. The deeper the fossa navicularis beneath the hymen, the more desirable incision is found to be in order to prevent misdirection of the phallus. An infantile vulva, which may be present in an otherwise normal woman, calls for self-stretching, douching, and special marital gentleness. Vaginismus is rare, and gives warning, for digital examination finds muscles in spasm. It almost never calls for muscle incision.

Certificates. The consensus of opinion in Europe, as shown in several recent books, is in favor of developing premarital examination into custom before putting it into code, not

hurriedly to crystallize decision concerning forms of prohibition or permits, but rather to encourage the "nupturients" to face the health issue as frankly as they do questions of income and social standing. The Scandinavian countries require a declaration concerning mental trouble, epilepsy, and venereal disease. Germany requires that applicants reveal to each other what communicable diseases they have had, annulment being granted for deception. In Holland a circular urging examination is given out by a government bureau on publication of the banns. Marriage advice stations are developing generally in Germany and Austria.

Direct questions on insanity, feeblemindedness, and epilepsy in either of the couple and in either family must always be asked. With the male, syphilis and gonorrhea will be a regular part of the verbal inquiry. The need of tests such as the Wassermann will be determined by the history, sexual experiences, and credibility. Whether to make verbal inquiry of the woman is to be decided by any experiences suggestive of exposure, but the absence of evidence of infection in meatus, cervix, and tubes will show the needlessness of giving offense.

Physical Examination. The patient's history indicates where the inquiry should be stressed in each particular case. With a neurotic family or personal history, especial attention will be given to the nervous system; with a tuberculous or cardiac heritage or symptoms, these possibilities will be stressed. Endocrine imbalance will be considered.

While making the chest examination, any defect in the nipple is noted. Abdominal palpation is followed by *external* measurements of the pelvis, ending with the transverse diameter of the outlet. Those who hesitate to examine the unmarried woman are again reminded that the essential information about the position and size of the uterus and ovaries is obtainable by recto-abdominal bimanual palpation,

and that if a leucorrhea calls for cervix inspection, a Sims speculum need be no larger than one finger, provided the narrow beam of light is used. The possible abnormal conditions to be borne in mind are: infantile size of vulva or uterus; absence of uterus and vagina; well-marked retroversion or anteflexion as danger signals of early abortion; ovarian cysts and uterine fibroids, their size and location; infected urethral glands and eroded cervix; and the after-effects of any operation (or delivery).

An ovarian tumor would call for operation before marriage. Small fibroids may only hamper fertility. Adherent tubes, as after appendicitis, would indicate present and probably future sterility. One must be wary of too definite prophesies of sterility when finding the lesser degrees of infrequent menstruation, anteflexion, infantilism, or fibroid development.

Summary. A program for minimizing disorders peculiar to women involves agencies inside and outside of medicine. The first rank in prevention is taken by skilled direction at the crossroads to the health of after life, namely, the first labor—before, during, and after. Next in importance comes supervision of mind and body in growing years and work years, in home and school, in business and industry. The chief neglect is in preparedness and examination for marriage and in the systematic survey after childbearing ceases. The most difficult problem is limiting venereal infections. The most delicate is estimation of the normal in sex life, and the formulation of instruction therein. Enormous progress is feasible by cooperation, for curtailing sickness and surgery, for fostering maximum service to the community by women, for satisfactory marriage, and for producing the most desirable children under the most favorable conditions.

CHAPTER XI

PEDIATRICS

PHILIP VAN INGEN, M.D.

PREVENTIVE Medicine plays an especially important part in Pediatrics. In dealing with adults the physician is attempting to prevent disease which may result in death or in disability, temporary or permanent, and also to protect the body from premature deterioration through abuse or neglect. With the child we have the same problem of the prevention of disease and its results, but instead of the problem of deterioration, we are dealing with development, the constant building of the rapidly growing body. During this period of construction, conditions must be so regulated and directed that that body, when maturity is reached, shall be anatomically and physiologically perfect, or as nearly perfect as possible. Preventive measures have been recognized as part of every day pediatrics longer than in any other field of medicine.

In dealing with children, therefore, one requires a wide knowledge of the normals of anatomy and physiology, and he must know and be able to recognize the earliest evidence of maldevelopment and dysfunction of every part of the human machine, in the various stages of development from birth to adolescence. To be able to perform his work efficiently, he must be able to explain the conditions he is attempting to correct, and have the patience necessary to acquire the confidence of the parents of his patients as well as that of the patients themselves. A knowledge of practical psychology is one of the most valuable assets of the pediatrician.

In a chapter as short as this must be, details of development, feeding, and general management cannot be covered.

Only certain important facts and principles can be briefly touched upon, and textbooks must be consulted for further information. In the same way in discussing special diseases, only such facts as have a direct bearing upon conditions in infancy and childhood will be considered.

Vital statistics tell us a good deal about our problem. That the mortality of infants is excessive has been recognized for a long time. That that mortality is preventable in large part, is not so well appreciated. It is not known generally that the death rate during the first year of life (72 per thousand in the Birth Registration Area in 1925) is not exceeded by any other age group until seventy-five to eighty-four years is reached. Even with the declining death rate and the greatly increased expectancy of life, the statement of Bergeron made many years ago, that "A baby born into this world has less chance of living a year than an old man of eighty, and less chance of living a week than one of ninety," still holds true. In New York City fifteen years ago the Infant Mortality Rate was 102. For the year 1927 it was 56.

Figures from the official reports of the Census Bureau for the five years 1920–24 inclusive shows some impressive facts as to factors in this mortality in infancy (Table I).

In other words only about 7.5 per cent of all the deaths during the first year of life are due to the common communicable diseases and infections, except those of the respiratory and digestive systems, which together account for 33 per cent, while prematurity, congenital debility, congenital malformations, and injuries at birth are responsible for 42 per cent.

These same reports show that these deaths during the first year of life occurred as shown in Table II.

Seventy-five per cent of all these deaths during the first month of life are due to prematurity, congenital debility,

TABLE I

PERCENTAGE OF TOTAL MORTALITY UNDER 1 YEAR FROM CERTAIN CAUSES, 1920–24

Typhoid fever	0.03
Measles	1.04
Scarlet fever	0.10
Pertussis	2.91
Diphtheria	0.55
Erysipelas	0.48
Tetanus	0.22
Tuberculosis (all forms)	1.11
Syphilis	1.14
Influenza—bronchitis, bronchopneumonia, "pneumonia"	16.80
Gastrointestinal	16.37
Prematurity and congenital debility	28.56
Congenital malformations	7.74
Injury at birth	5.46

TABLE II

	Per Cent
Under 1 day	18.96
Under 1 week	36.97
Under 1 month	51.30
One month and under 1 year	48.70

and congenital malformations. Ballantyne was the first to emphasize that the mortality during the first month is due to conditions acting upon the child through the mother before birth, or to conditions due to birth; that during the remainder of the first year it is due to the same general conditions affecting the rest of life, a germ-laden atmosphere.

The prevention of over 51 per cent of this loss of infant life is therefore the problem of the obstetrician and has been discussed in the proper place. It is the function of every physician to urge the pregnant mothers of his patients to seek early and follow expert advice through pregnancy. For careful, wise prenatal care has reduced this mortality

during the first month very materially and has a considerable influence on the health of those who survive as well.

As regards the prevention of other conditions likely to cause death during the first year of life, we are therefore concerned chiefly with the prevention of gastroenteric disease, a problem of feeding and hygiene; respiratory diseases, a problem of hygiene largely; and the other infections and communicable diseases, which will be discussed later, for the methods are practically the same throughout childhood.

Diet and Growth. During the first half year of life the chief activity of the child is bodily growth, and it is important that this growth should be normal. The average child at birth weighs about 7 lb., varying to an uncertain degree according to the nationality, sex, and family characteristics. The average normal baby should double its weight in five months and about treble it in a year. Weight alone, however, is not the only guide. Length is perhaps as important, especially after long illness, although the figures are less definitely worked out for such short intervals as months. The average baby at birth is about 20 inches in length, and at five months has gained 6 inches, and at one year 10 inches.

This growth depends on proper food, and while we cannot go into a detailed description of infant feeding, certain facts kept in mind may avoid a vast amount of trouble for the child and the physician. The methods of infant feeding during the past thirty years have undergone a great many changes, many valuable and based on both scientific and practical experience, but it is regrettable that some practices are not based on common sense. In the first edition of Holt's "Diseases of Infancy and Childhood" (1897), he limits the food during the first year to milk and perhaps a little gruel or beef juice. In the second year "milk should be the basis of the diet." Rare scraped beef or mutton may be given

"after the eighteenth month," and "a soft boiled egg may be given in place of the meat once or twice a week." Orange juice is begun in the fifteenth month, "a little later" baked apple and prunes, at eighteen months five meals are still recommended. Today the pendulum has swung the other way, perhaps—probably—too far, and it is to be hoped that modern feeding will soon become more normal and rational.

The discovery of the so-called vitamins has been largely responsible for the overfeeding of infants. Their importance, however, is not to be underestimated. Another factor is the falling off of maternal nursing, voluntarily and involuntarily. That good mother's milk is the ideal food for a baby, at least for six months, is undeniable. The average nursed baby gains in weight faster than the bottle-fed baby can gain safely. The majority of digestive upsets and calamities, and malnutrition are more often due primarily to overfeeding than to any other cause. This is in great part due to the desire of nurses, mothers, and too many physicians to have a bottle-fed baby as heavy as one on breast feeding.

The infant requires protein, containing the essential nitrogen, to build body tissue, carbohydrates and fat for heat production. It requires these contituents in ever increasing quantities. The amount of nitrogen required during most of the first year can best be secured from milk, and as a general rule the optimum amount of nitrogen will be provided by from 1½ to 1¾ ounces of milk per pound of body weight, for the normal healthy child. In the underweight child, one who has been through a long illness, the weight is of little value as a guide. The normal weight for the actual body length in such cases is a safer one. The caloric needs are in a general way as shown in Table III.

It must be borne in mind that children do not all gain steadily and uniformly. The third quarter of the first year is the usual time for the eruption of the first teeth. It is the

Table III

Age	Calories Required	Calories per lb. Weight
1 month	400–450	40–45
3 months	550–575	47
6 months	700–725	45
9 months	825–875	43
1 year	875–925	42

time for mental development to become more evident. The child begins to use its muscles more and begins to have some coordination. This is the period of slowest gain in weight. Infants who begin to show these later phases of normal development early are likely to fail to gain as rapidly as the average. It is then that the nurse and mother are apt to add "just a little" to the food, often with unfortunate results. While weight is our best single guide, a steady gain is not always the essential. Children who are taking a suitable amount of food, digest well, seem satisfied by sleeping well, crying only a normal amount, whose color is good, and whose flesh is firm, can fail to gain "normally" for some time without causing apprehension. They will usually begin to gain, often rapidly, after a few weeks. Some children do have to be fed more than the "standard" amount, but before adding to the diet it is well to decide whether a crying, unhappy baby, who sleeps badly and does not gain is not getting too much food rather than too little. It more often is than not.

There is another phase of the problem of proper and sound body building of the infant which by those who deal little with babies receives too little attention. Its importance to the health of older children is better recognized, so it is mentioned while we are still dealing with the infant. It is

the influence of environment in general upon the normal growth and development. The new-born baby for several months is getting adapted to a new method of existence, utterly different from that of intrauterine life, and it is doing it in entirely different surroundings. It wants quiet, food, and air, and to be kept clean and comfortable and that is practically all. It is too often made the plaything of its parents, its sleep broken to be shown off to admiring (?) friends, and its regime interfered with. Some children stand this with no apparent ill effects to their physical well-being at the time, but before changing a sensible, adequate schedule of feeding it is well to investigate personally the envirnoment in all its details. A fussy, noisy, impetuous nurse, a mother who must play with and toss about her baby, are often the cause of failure to gain in weight, and not the food. The effect on the mental development of the child is apt to appear later and then be ascribed to other causes.

After the first year of life the problem of body building is more simple. This child is now better equipped to handle a more varied diet, needed to meet its every increasing activity. The selection of food is based on simple facts. When the child is equipped with sufficient teeth to chew firmer food, this should be added, and it can gradually be increased until by the end of the second year the child is practically on the same food that it will require all through childhood. Regularity of feedings, avoidance of eating little bits between meals, and sticking to a simple sensible diet is all that is needed. Monotony in the food provided disturbs the parent much more than the child. The meal time should be a period devoted to eating and no other occupation. The child who has to be played with, read to, and otherwise enticed to eat is either ill or is satisfying one of the great fundamental instincts of childhood, love of attention. It is surprising how early a child grasps this power of getting attention; and much

trouble, really affecting the child's general health and nutrition, and therefore an important factor in promoting its health, can be prevented by sensible handling.

Habits. The training of a child in regular habits cannot be begun too early. A regular hour for having its stool should be started in the first year. Most children can learn surprisingly early to make their wants known. Bedwetting, while perhaps not really affecting the health of the child, is often a great inconvenience. It is surprising how many nurses, parents, and even physicians are really responsible for this habit being prolonged many years. The child is "taken up" at ten and voids, but it is the exception to find that the child is *wakened* for this purpose. Practically asleep it voids and no impression is made and then later, dreaming, the desire is promptly satisfied. A child should never be encouraged to void half asleep.

During the entire preschool age the nervous system of the child should be protected from exciting play, of adult invention, and being shown off; stories of ghosts, pirates, giants, should be reserved for an age when the mind realizes it is all make believe.

During school life the child suffers in its general health and nutrition, from the ambition of its parents and teachers, more than anything else. This applies particularly to the children of the well-to-do. Boys do not suffer quite so much as girls. But all are pushed to the limit, and often beyond the limit, of their endurance. The day schools lay it to the boarding schools, and they to the college requirements. Almost every girls' school wants its pupils at least to pass the College Board examinations, whether they go to college or not. Most mothers are ambitious for their daughters. French is a valuable accomplishment; so are dancing, music, skating. The child is at school from nine till one or two or later. lessons must be done at home, an hour or more. In between

TABLE IV

TABLE OF DAILY DISTRIBUTION OF ACTIVITIES (BOYS)

	6 Years		8 Years		10 Years		12 Years	
	School Days	Week End	School Days	Week End	School Days	Week End	School Days	Week End
Study	2 h. 45 m.	0	3 h. 25 m.	0	4 h. 15 m.	0	4 h. 30 m.	0
Vigorous exercise	2 h. 55 m.	6 h. 0	3 h. 35 m.	7 h. 0	3 h. 45 m.	7 h. 30	4 h. 50 m.	8 h. 0
Relaxation*	6 h. 20 m.	6 h. 0	5 h. 30 m.	5 h. 30 m.	5 h. 0	5 h. 30	4 h. 10 m.	5 h. 30 m.
Awake	12 h. 0	12 h. 0	12 h. 30 m.	12 h. 30 m.	13 h. 0	13 h. 30	13 h. 30 m.	13 h. 30 m.
Asleep	12 h. 0	12 h. 0	11 h. 30 m.	11 h. 30 m.	11 h. 0	11 h. 0	10 h. 30 m.	10 h. 30 m

* Eating, dressing, reading, etc.

two and five or six must come dancing lessons, French lessons, music lessons, piano practice, and study. Little time is left for exercise in the open and recreation. Dr. R. M. Smith, of Boston, has prepared a valuable time table for the hours of work and play of boys at various ages, and it is here given in modified form (Table IV).

Periodic Examinations. During the first six months of life, we are chiefly concerned with the growth of the child, the proper adjustment of his feeding, and the regulation of his environment. Infections, other than those arising from the intestinal tract, are very infrequent. During the first six weeks a baby should be seen every week, and from six weeks to three months of age every two weeks. From three months to the first year every month. After the sixth month, especially in the winter season, the first symptoms of rickets may begin to appear, and infections of the upper air passages are more frequent.

During the first year, with intelligent parents, telephonic reports may replace personal visits. But even intelligent parents or nurses cannot be relieved upon to detect early signs of dysfunction or maldevelopment, and a personal examination should be made at least every other time.

During the second year, the child should be seen at least every three months, and after that from two to four times a year.

It is during the second to the seventh or eighth year that physical defects begin to be developed: malnutrition, dental caries, the effects of diseased or enlarged tonsils and adenoid tissue, postural defects, etc. Examinations should not be superficial. They must be complete and thorough, and the history of the child's activities and physiological processes should be as much a part of this examination as recording its height and weight, or examination of the heart and lungs. Even in middle and later childhood, it is occasionally well

to have the examination at the home, when environment can be better appreciated. It will often explain conditions heretofore not understood, as already mentioned. It is the child's general *progress*, physically, functionally, mentally, which must be watched and recorded.

Tables of height and weight for age are so generally available, it is not necessary to reproduce one here.

Deficiency Diseases. Before going into a brief discussion of the prevention of the common diseases of childhood, it may be well to discuss briefly the so-called deficiency diseases.

Rickets is a disease which until recently was little understood. It was laid to a great variety of causes. As Hess[1] says: "Rickets has been ascribed to almost every deleterious influence which is known to affect human beings—to defective hygiene, improper diet, intestinal toxins, bacterial infection, derangement of the secretions of the endocrine glands, etc." The symptoms of a well-marked case are too well known to need mentioning, but certain facts do not seem to be kept quite so clearly in mind. It is a disease which shows its earliest symptoms most frequently between the seventh and eighteenth months although it may occur in the sixth or even the fifth month, especially in premature babies. It is a disease which develops most frequently in the winter months, when there is least sunlight. It is apparently due to deficient calcium metabolism, with a low inorganic phosphorus content in the blood. Talbot[2] says: "When the blood serum contains less than 3 milligrams of inorganic phosphorus per 100 c.c., the individual becomes rachitic; when 4 or more, he is recovering, when 6 milligrams, rickets is not present."

The earliest symptoms are sweating about the head, head rolling resulting often in wearing away of the hair over the occiput, restlessness, and irritability.

[1] Abt, I. System of Pediatrics.

[2] *Clin. Pediat.*, 13: 114.

Two factors play a part in bringing on rickets. Lack of exposure to the ultraviolet rays of direct sunlight, and a deficiency of food containing the antirachitic vitamin D. This vitamin is present in large quantity in cod liver oil, and in small amount in egg yolk, butter fat, and cocoanut oil.

The prevention of rickets is easy. Cod liver oil should be administered early, certainly at three months. Some pediatricians favor beginning it at one month. It should be given in doses of about 5 drops twice or thrice daily, at two months, and increased to ½ teaspoonful at a dose at three months. It should be continued through the second year. Cod liver oil in sufficient doses will by itself prevent rickets, but the direct rays of the sun, in spring and summer at any rate, will also prevent it. Babies should be out-of-doors therefore as much as possible in the spring and summer. The mercury vapor lamp is a valuable means of prevention also, as its rays have prophylactic and curative value. To a less extent the white flame carbon lamp also is effective, but requires longer exposure.

In very hot weather, in children over six months of age cod liver oil may be omitted provided they are out in the open air a great deal, expecially at the sea shore.

Scurvy is a disease characterized by subperiosteal hemorrhages, extreme tenderness of the affected parts, bleeding from the gums, and anemia. It is most common during the second half of the first year, and very rare after the second year. It is definitely caused by a prolonged deficiency of water soluble vitamin C, and is rapidly cured and easily prevented by the use of food which contains it. This vitamin is present in large amounts in fresh lemon juice, orange juice, raspberries and lettuce, and in considerable quantity in lime juice and canned tomatoes. Orange juice, or when this is not well tolerated, which is not often, the juice of

canned tomatoes should be added to the feeding at two or three months of age. One teaspoonful gradually increasing to a tablespoon may be used. If tomato juice is used, double the quantity mentioned should be given. It must not be cooked, as heat destroys it very rapidly.

Scurvy is better understood today than twenty years ago, but it is still surprising how many cases are admitted to our hospitals with the diagnosis of rheumatism, arthritis, or osteomyelitis. Any child who resents the handling of a limb or who cries out with apprehension when approached is entitled to orange juice or tomato juice until a diagnosis of some other condition is definitely made.

Xerophthalmia is a very uncommon disease in this country. In infants it usually develops in the second and third quarters of the first year. It is due to a deficiency in diet of fat soluble vitamin A which is present in large amounts in cod liver oil, butter fat, egg yolk, and in the leaves of celery and spinach. It is therefore unlikely to occur in any baby fed on a reasonable diet, particularly when cod liver oil is being given. The disease is characterized by dryness of the conjunctiva, with gradual development of opacity of the cornea which goes on to perforation. In older children night blindness is complained of at times. The prevention is indicated above.

Table v shows our present knowledge of the presence of vitamins in various foods. In slightly abbreviated from, it is that prepared by the Division of Maternity, Infancy and Child Hygiene of the New York State Department of Health.

Cretinism. A deficiency of the thyroid hormone results in the condition called cretinism. When the deficiency is marked the diagnosis is readily made. But there are numerous cases where the clinical picture is not so definite. It is at times difficult to distinguish between cretinism and mongolism in early life. While the condition is not usually diagnosed

Table V

FOODS ESTIMATED TO BE THE BEST SOURCES OF VITAMINS

+++ indicates excellent or best source of vitamin
++ indicates vitamin present in larger than average amounts
+ indicates vitamin is present

(Estimates are based on experimental tests made by scientists on animals and humans. The subject of vitamin research is still under active investigation. Undoubtedly further qualities will be attributed to them)

VITAMIN A called, "anti-ophthalmic" (so called because of its connection with curing an eye disease, xerophthalmia		VITAMIN B called, "anti-neuritic" (so called because its discovery was connected with the cure of a nerve disease)	
Sources of A		Sources of B	
Cod liver oil +++	Buttermilk +	Whole grain cereals +++	
Butter +++	Almonds +	Tomatoes +++	
Cream +++	Cocoanut +	Beans, kidney and navy +++	
Milk, whole +++	Peanuts +	Raw cabbage +++	
Milk, condensed +++	Beans +	Spinach, fresh +++	
Milk, evaporated +++	Cauliflower +	Yeast products ++	
Milk, dried +++	Potato +	Cream ++	
Egg yolk +++	Apples +	Fruits ++	
Spinach, fresh or canned +++	Oranges +	Potatoes ++	
Thin, green-leaved vegetables ++	Prunes +	Nuts ++	
Germs of seeds ++	Barley (whole) +	Liver ++	
Liver ++	Yellow corn +	Cocoanut ++	
Kidney ++	Oats +	Kidney ++	
Cheese ++	Wheat bran +	Brains ++	
Tomato ++	Brains +	Fish roe ++	
String beans ++	Heart +	Egg yolk ++	
Raw cabbage ++	Fish roe +	Pancreas (sweet breads) +	
Carrots, cooked or raw ++		Heart +	
Fresh peas ++	Vitamin A loses its power gradually on exposure to air and high heat. It withstands ordinary cooking temperature with little loss.	Practically all vegetables +	Vitamin B is not affected by ordinary cooking or drying. But the addition of soda during cooking rapidly destroys it. It dissolves readily in water and hence is lost if cooking water is discarded.
Sweet potato ++		Milk (varies with diet of cow)	
Squash ++			
Pineapple, raw or canned ++			
Peaches, raw or canned ++			

VITAMIN C called, "anti-scorbutic" (first known as a cure for scurvy)		VITAMIN D called, "anti-rachitic" (so called because it protects from the disease, rickets)	
Sources of C		Sources of D	
Tomatoes +++ Lettuce +++ Raw cabbage +++ Spinach, fresh or canned +++ Fresh peas +++ Oranges, and other citrus fruits +++ Raspberries +++ White potatoes ++ Yellow turnips ++ Peaches ++ Apples ++ Milk and cream (vary with diet of cow)	Vitamin C is very easily destroyed by cooking, drying and canning except in the presence of acids.	Cod liver oil +++ Milk (whole, fresh) ++ Egg yolk + Butter + Cocoanut + Green leaves + Fresh peas + Whole wheat + A similar factor can be produced in foods by irradiating them with ultra-violet light. Humans can get the same effect by tanning or by sun baths.	Vitamin D is not readily affected by heat, etc.

till the second half of the year, the first signs should be noted, if a baby is carefully watched, in the second or third month. It is the early signs in which we are particularly interested. The baby is unusually quiet. The infrequent cry is apt to be hoarse and husky. There is scant hair. The tongue is large, thick, and is apt to protrude. It often interferes with nursing. Careful examination may reveal the typical cretin facies. The body weight may be normal or even above normal, but the body length is not. The baby fails to increase in length in a normal way.

Thyroid therapy should be considered for any baby with such symptoms, even before a positive diagnosis is made. Metabolism studies have helped very much in rationalizing the use of thyroid and, when possible, such control should be utilized.

Simple Goiter. We know now that simple goiter is due to a deficiency of iodine. It has been shown that if iodine in the thyroid is less than 0.1 per cent of the total gland tissue, hypertrophy occurs. This condition is one which develops during the pubescent period. It is seen with varying frequency in all parts of the country, but is very prevalent in some places, *e.g.* in the Pacific Northwest and around the Great Lakes. The water in these areas is found to be very low in iodine; the lower, the more prevalent is goiter. The administration of iodine as sodium iodide, or in an organic compound is a cure and preventative of this condition. From 3 to 10 mg. of iodide may be given in some one of the special preparations, once a week, with entirely successful results.

"**Diarrheal Disease.**" During the first year of life gastro-enteric disturbances play a very important part in the mortality, morbidity and subsequent malnutrition of children. Such disturbances in the five years 1900–1904 caused 24.2 per cent of all deaths under one year; in 1920–24, 16.4 per cent. Over 10 per cent of all the deaths under one

year from all causes during a calendar year occur during the months of July and August, from "diarrhea and enteritis." This improvement is due to two factors: the tremendous improvement in the character of the milk supply, especially for large cities, with the very general adoption of pasteurization, and the increased knowledge of the people in general of the necessity of proper care and use of milk. Another important factor is the greater control of the feeding of well infants by physicians than was formerly the case. But while government control of the milk supply has been a great safeguard, it sometimes falls down, and during the hot summer months it is wiser to boil the milk before preparing it for a baby's use. When "on vacation" this is always a wise safeguard.

During the second year gastrointestinal diseases play a very important part, and then rapidly decrease.

TABLE VI

PER CENT OF DEATHS FROM DIARRHEA AND ENTERITIS 1916–20

2nd year	26.6 per cent
3rd year	14.4 per cent
4th year	8.9 per cent
5th year	6.2 per cent
6–10th year	3.1 per cent

In addition to the influence of impure milk other foods play a larger part after the first year, again especially in summer. Fruit is now conveyed long distances and is often picked half ripe, to "ripen" en route. Among the foreign-born population fruit is much used, especially among Italians, and the death rate from diarrheal conditions is much higher among these people. It is therefore wise to confine children to foods which are less liable to decomposition by long journeys and heat. During hot weather less, and easily digestible, food should be given.

Respiratory Infections. Little can be added to what has already been said in regard to prevention of these very prevalent infections. The problem is practically the same as in adult life and has been previously covered. Contact of children with one another and with adults is much closer than that between adults, and the "common cold" is still too lightly regarded by many people. Personal hygiene is our chief resource still.

Communicable Diseases. *Measles* is an acute infectious disease, the cause being as yet not determined to the satisfaction of all observers. It is contained in the secretions of the nose and throat of the infected person. It is to be hoped that the extensive research being carried on may result in the definite isolation of the infecting agent. To none of the other common communicable diseases are children so susceptible, as to measles. By the time adult life is reached almost everyone has "had measles." During the first few months of life most infants are not susceptible. While in children from two years on the disease is not usually serious, in infants, and delicate children it may be a very serious and often fatal disease. Eighty-nine per cent of all deaths from measles occur under ten years of age.

Its prevention is quite difficult, as it is very infectious for several days before the appearance of the eruption. A temporary immunity can, however, be produced by the injection of the serum from recent convalescent cases, and this is a procedure which should be resorted to in all infants and children under two, and in delicate older children. The earlier the serum is injected, the sooner the protection. Five c.c. should be given. Larger doses, except perhaps when given late and in older children are no more efficacious. This temporary immunity lasts a very short time, only a few weeks at most. Even if the injection of the serum does not prevent the disease, it usually modifies its course, the symptoms

being less severe, the rash very slight, the duration shorter, and complications less likely. The chief difficulty is in securing the serum, and it should therefore be reserved for very young and delicate children, as almost everyone must eventually contract measles, apparently.

Strict isolation of the patient, and the greatest care in handling infectious material from the patient must be carried out. Quarantine should be maintained till all catarrhal symptoms have subsided.

The researches of Tunnicliff and Hoyne, Ferry and Fisher, and others give good reason to hope that an immune serum or some agent capable of producing an immunity may soon be produced.

Scarlet Fever. That scarlet fever is caused by a hemolytic streptococcus is definitely settled. The infection is spread by the discharges from the nose and throat, and from secondary foci, such as suppurating glands, otitis media, etc. The old theory of the infectiousness of the desquamating skin is thoroughly discredited. Just how long the disease is communicable is still an open question. The majority of health regulations require isolation for thirty days, and until discharging sinuses are healed.

There is a very considerable natural immunity against scarlet fever, a large proportion of exposed persons not contracting the disease. In very young children it is a most serious disease. Half of the cases occur in children from three to seven years of age. Its virulence seems to vary from year to year, and during the last ten years there has been a striking reduction in the death rate. The disease can be transmitted by infected milk. How much the improvement of the milk supply is responsible for this reduction is not possible to say.

Seventy-four per cent of all deaths from scarlet fever occur in children under ten years of age.

Susceptibility to scarlet fever can be tested by the "Dick test." It consists in the injection into the skin of a definite quantity of the scarlet fever toxin. A positive reaction consists in an area of erythema at least 1 cm. in diameter twenty-four hours after injection, with very slight elevation of this area. The intensity of the erythema varies, but if 1 cm. in diameter, no matter how slight, it is called positive. It is necessary that the test be done very carefully and that 0.1 c.c. of the dilute toxin be used and that all should be injected *into* the skin. The susceptibility to scarlet fever as shown by the Dick test is given by Blake[1] in Table VII.

TABLE VII

SUSCEPTIBILITY TO SCARLET FEVER

0–6 months	45 per cent
6–12 months	65 per cent
1–2 years	70 per cent
2–3 years	65 per cent
3–4 years	60 per cent
4–5 years	50 per cent
5–10 years	35 per cent
10–20 years	20 per cent
Over 20	15 per cent

The use of toxin as recommended by Dick and Dick in the active immunization against scarlet fever has its strong advocates as well as opponents. It is claimed that within one to two weeks after three doses of the toxin, given at intervals of seven days, immunity has developed. How long this immunity lasts is still a question. The value of this procedure is still unsettled. While scarlet fever is usually not a serious disease itself, its after effects, late complications, are serious. The relation of nephritis to scarlet fever is too well known to need any comment here.

Whooping cough is transmitted through the secretions of the trachea and bronchi, broadcast in coughing. In infants

[1] Nelson's Loose Leaf Living Medicine. 6: 4671.

and young children it is a serious disease and often results fatally. Its prevention in the very young and delicate is therefore very important. Unfortunately its early stages are far from characteristic. Isolation of children with colds and cough is a feat difficult to accomplish, and as the early or catarrhal stage is when the organism (Bordet-Gengou bacillus) is most abundant in the secretions, prophylaxis is difficult. In the early stages there is a leucocytosis in most cases with a greatly increased proportion of the mononuclear lymphocytes. The blood of any child with a cough, increasing in severity and frequency, and without much if any temperature elevation, should be examined, and if this lymphocytosis is present, it should be considered a case of whooping cough. Just how long the disease is infectious is not definitely known. A child should be kept from cantact with susceptible children until the paroxysmal cough has disappeared for from two to three weeks.

While there is much scepticism as to the value of vaccine treatment in the disease, there is abundant evidence of its value as a prophylactic or, if given early, of its value in aborting the disease. Shaw[1] reports only 7 per cent of 164 children, exposed in an institution, contracting the disease after its use, whereas in previous epidemics over 60 per cent contracted it. In a disease which kills 7000 to 8000 children every year, of whom from 50 to 60 per cent are under one year and 99 per cent under 10, it is worth trying anyway. The doses should be large and three doses at intervals of two or three days given. If the vaccine is given after long exposure to the disease, 4 or 5 doses may well be given. Especially should infants and young or delicate children be so treated.

Smallpox. In most communities smallpox is now a rare disease. Many physicians never see a case. It is hard to realize that in the eighteenth century half of all the deaths

[1] *Clin. Pediat.*, 14: 138.

of children under five years of age are said to have been due to smallpox.

Except for very delicate children, every infant should be vaccinated before the end of the first year, preferably before six months. Modern methods of vaccination have reduced the unpleasant aspects of the matter. A single scratch, not more than $\frac{1}{8}$ inch in length, or at most two parallel scratches, with a sterile needle should be made through a drop of the virus placed upon the skin, which should first be thoroughly cleansed and dried. Gently rubbing with the needle afterwards helps to secure the inoculation. The scratches should only break the surface of the skin and not draw blood. A slight puncture of the skin with the point of the needle through the virus is almost equally satisfactory. A small bit of sterile gauze and a bit of zinc oxide plaster should be placed over the site of the inoculation for eighteen to twenty-four hours. It may then be removed and the child bathed as usual until the vesicle begins to form. The latter should then be covered with sterile gauze held in place with adhesive strips, until the scab falls off.

If the first vaccination is unsuccessful, *i.e.* does not produce vaccinia, it should be repeated, as practically every person is susceptible to smallpox. How long the immunity persists varies. Sometimes it is for life. But it is much safer with such a disfiguring and serious disease to repeat the inoculation after from seven to ten years. If an epidemic exists in the locality, it should be done if five years have elapsed since the first inoculation.

Diphtheria. Two things should be emphasized about diphtheria: (1) It is a serious disease. (2) It is *practically* preventable. Eighty-six per cent of all diphtheria deaths are in children under ten. Its prevention is, moreover, a harmless procedure. The serious effects of protective inoculations have been due to freezing of the toxin-antitoxin

mixture, or to mistake in labeling, the toxin instead of the toxin-antitoxin being used. With smallpox and typhoid, diphtheria may now be eliminated from a community. There are few diseases, the history of whose treatment and prevention is as spectacular as that of diphtheria. In New York City the general use of antitoxin in its treatment was begun in 1894. In the previous year, 1893, there were 1970 deaths. In 1921 the general use of toxin-antitoxin in the prevention was started. The previous year, 1920, there were 1066 deaths. In 1926, the total deaths were 477. In 1893, the population of New York City was 1,758,000; in 1926 it was 5,924,000. If we allow for this change in populaton in estimating results, it stands as shown in Table VIII. That is, in 1926 there was 1 death for every 14 in 1893, and for every 2 in 1920. Antitoxin therefore reduced the mortality five-sixths between 1893 and 1920, and antitoxin plus immunization has cut this mortality more than half in six years and reduced it to practically one-fourteenth that of 1893.

TABLE VIII

	Actual Deaths	Corrected for Population, 1926	Ratio
1893	1970	6638	13.9
1920	1066	1115	2.3
1926	477	477	1.0

Still more striking results have been obtained in smaller localities when more complete campaigns could be carried out. For instance in Auburn, N. Y. the results are as shown in Table IX. For the last four years, 1924 to 1927, there has been one death from diphtheria in Auburn, and that in a child whose parents refused inoculation.

There is a marked immunity to diphtheria at birth, but this is rapidly lost, to be again gradually developed as the

TABLE IX

Before Immunization Began				Immunization Begun in 1922											
1920		1921		1922		1923		1924		1925		1926		1927	
Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
96	17	131	14	92	13	47	7	22	1	13	0	7	0	10	0

child advances in years. Park has estimated the susceptibility at various ages (Table x).

Table x

	Country, Per Cent	City, Per Cent
Under 3 months	30	15
3–6 months	50	30
6 months to 1 year	80	60
1–2 years	85	70
2–3 years	75	55
3–5 years	70	40
5–10 years	65	30
10–20 years	60	20
Over 20 years	50	15

Diphtheria is more prevalent in the city than in the country districts. It is probable that the reason for the higher immunity in cities is that, it being more prevalent in them, more people harbor diphtheria bacilli in their throats without becoming obviously infected and sufficient antitoxin is developed to produce gradually an immunity.

The Schick test gives very accurate results as to susceptibility if made carefully. It consists in injecting 0.2 c.c. of a solution of the toxin of diphtheria of definite strength into the skin. This should leave a small circular elevated whitish mark, showing the solution has been injected *into* the skin and not under it. Twenty-four to forty-eight hours after injection a reddened area appears about ½ inch in diameter, or larger, which persists for several days, gradually fading, and may be followed by desquamation. Sometimes the redness persists for several weeks.

Every susceptible child should receive a protective inoculation against diphtheria. In children up to one year of age the

Schick test is not necessary, as relatively few are immune, and the test causes more discomfort than the inoculation. Three doses of 1 c.c. of "toxin-antitoxin" are given at intervals of seven days. This in the great majority of cases gives an immunity within six months, but a Schick test should be made in every case after six months, and the inoculations repeated if it is still positive.

A child who has never been immunized and who is exposed to diphtheria should be given a protective dose of antitoxin (about 1000 units) and cultures should be taken. It cannot be too strongly emphasized that the early use of antitoxin in cases of diphtheria is extremely important, and it is much safer to give it unnecessarily than to wait till one is sure of a positive diagnosis.

The importance of the early administration is strikingly shown in the reports from the Willard Parker Hospital in New York, of the mortality from diphtheria by day of illness in which antitoxin was first given (Table XI).

TABLE XI

MORTALITY BY DAY OF FIRST ANTITOXIN ADMINISTRATION

1st day	4.3
2nd day	6.9
3rd day	10.9
4th day	16.0
6th day	21.7

Strict isolation and the disinfection of all utensils and discharges should be maintained until two successive cultures twenty-four hours apart have given negative results. These cultures should be taken *carefully* and from both nose and throat. No local application should have been made for several hours before the cultures were taken.

Typhoid Fever, Paratyphoid A & B. While typhoid fever is not a common disease in young children, it does occur.

In every large hospital a number of cases come in each summer, usually from the summer "camps." Often it is found that a carrier is working there and is responsible. Inoculations with the "combined vaccine" should be given to every child who is going where the milk and water supply are unknown, or are known to be insanitary. This applies to vacation camps and when travelling. Three injections at intervals of a week should be given. The dosage should be based upon the age and weight of the child. The reactions are less severe in children than in adults.

Whether or not inoculations are given, milk and water from any source of unknown purity should be boiled. In traveling this is always a wise procedure.

This disease has been discussed elsewhere and needs no further remarks.

Dysentery. What has been said in regard to the prevention of typhoid and gastroenteric diseases covers this subject.

Other Communicable Diseases. Such diseases as mumps, chickenpox, and German measles are of such minor importance to the ultimate health of the individual that little need be said. It should, however, be mentioned, in regard to chickenpox, that it may cause considerable disfigurement by scarring, and it is therefore important to avoid it in very early childhood, when the child is with difficulty restrained from rubbing, scratching, and infecting the pocks. When contracted in adult life, these diseases cause much inconvenience and it is reasonable to regard them as better over in middle childhood, than not.

Their prevention lies solely in the isolation of persons suffering from the disease and of those exposed during the period of incubation when most liable to become further sources of infection.

Rheumatic Infection. The clinical manifestations of rheumatism occuring in the adult are rare in children.

Cardiac valvular disease, a direct result of this condition, is in the majority of cases discovered by accident or without any history of joint symptoms. This makes a recognition of the conditions which indicate rheumatic infection and the elimination of the focus of infection extremely important. A history of indefinite pains in the extermities, often classed as "growing pains," fever of short or long duration without any definite cause being ascertained, and frequent attacks of tonsillitis should all be regarded as indications of rheumatic infection and liable to be followed by cardiac involvement.

The physician who is watching over the development of a child should always be on the lookout for possible sources of infection. The tonsils are probably the most common focus, and even when there is no apparent abnormality they should be removed in such cases. Tonsils apparently normal in size are often "buried" and when enucleated are found to be large and distinctly diseased, even with small unsuspected abscesses demonstrable. Carious teeth are another frequent source of a chronic infection and should be extracted if beyond repair. Abscesses about the roots of the teeth should never be neglected, but given expert dental treatment. The importance of dental hygiene in prevention of disease is only beginning to be realized by the profession at large.

Infected sinuses in children are fortunately less frequent than in adults, but it is regretable that many are overlooked and are the cause of much chronic infection with varying phenomena. These subjects are discussed in the proper chapter and are merely mentioned to emphasize their importance.

The vast majority of cases of cardiac valvular disease begins in childhood, and its prevention is of the greatest importance.

CHAPTER XII

NERVOUS AND MENTAL DISEASE

BERNARD SACHS, M.D.

IN the attempt to prevent, or at least to curb, the incidence of nervous and mental disorders throughout life, several factors of prime importance are to be considered. These are, sound heredity, proper protection of the health of the mother during pregnancy, and all possible care and skill at the time of delivery of the child; careful and sensible guidance of the child through the first years of life, rational school training, proper supervision during the adolescent years; abstinence from sexual and alcoholic excesses, and avoidance of syphilitic infection. These general statements apply to the problem of the prevention of organic and functional nervous disease and of mental disorders.

In the matter of "sound heredity" it may be suggested that individuals who are afflicted with some form of transmissible disease, above all those suffering from marked specific infections and those known to come of families in which there is a definite strain of mental afflictions, should not marry. If they do marry, the prospects of normal progeny would be improved if such individuals were at least mated with those of known healthy stock. Above all, if there is a distinct hereditary taint of nervous or mental disease there should be no intermarriages and there should certainly be no children.

The health of the mother during pregnancy is a matter of vital importance. Although some definite knowledge has been gained as to the effect of injury to the mother upon the development of the fetus, it is difficult to obtain full statistical evidence; but the mention of persistent worry, of neglect,

of great emotional disturbances, of malnutrition, of renal disease, is so frequent in the prenatal history of children suffering from arrested mental development and from cerebral and spinal disorders, that it will be well to urge upon the prospective mother that her own physical condition, while she is carring the child, will have the greatest possible effect upon the development of her baby.

The proper physical care of the infant in the very first months of life, the sensible training and disciplining of the child in the earliest years of life, and the important bearing that such training has upon the development of the normal child, are recognized today as of the utmost importance. It may be stated generally that many of the neuroses and psychoses of later life could be prevented if the child in its earliest years were guided sensibly with due regard to its emotional development. Further evidence of the importance of the factors mentioned above will be given when we proceed to a detailed consideration of the prevention of the various forms of nervous disease.

Diseases of the New Born. Differentiation must be made between diseases of antenatal origin and those due to difficulties during labor. Of course, all strictly hereditary forms of disease may be considered to be antenatal in origin, but in addition to this more or less vague conception, it must be remembered that the fetus itself is subject to various forms of disease. Soluble toxic substances may be diffused through the wall of the uninjured placenta; a minute injury in the placenta, according to Edgar, may permit the passage of vast numbers of microorganisms. For these reasons it is most important that the mother during pregnancy be guarded against every form of infectious disease, in so far as is possible. It is now fairly well established that lues is transmitted directly through the mother (positive Wassermann reaction in an apparently healthy mother) and indirectly through

the father. Therefore, when there is the least suspicion of lues in either parent, thorough specific treatment should be given before conception takes place, or at least during the earliest period of pregnancy. From the social point of view, it is fortunate that active lues often leads to miscarriages or to the death of the fetus in utero. Were it not for this circumstance hereditary lues would play a far more pernicious role than it really does.

Congenital tuberculosis is a little more common, and since it does occur now and then, the only safeguard would seem to be that a frankly tuberculous woman should not be allowed to become pregnant; and if pregnant, the question arises whether her pregnancy should not be interrupted. There is always the fear of coming into conflict with the law, but many an honest physician of large experience will grant much that misery could be avoided, if, after due conference with another colleague, the honest endeavor would be made to prevent the birth of a child that is destined to be afflicted with one or other of these serious constitutional disorders.

It has been claimed, but not definitely proven, that poliomyelitis and even encephalitis lethargica may develop in utero. For this reason it would be wise to keep the pregnant mother, so far as is possible, out of reach of either disease. The family physician can best educate the prospective mother and the family as to the importance of safeguarding her against these diseases and also against possible premature delivery. Children born prematurely, especially those born in the seventh and eighth months, are prone to serious cerebral disorders, for instance so-called Little's disease.

As for the diseases due to conditions during labor, a very solemn warning should be given. Obstetrical and general medical doctrines have never come to grips on this very important point. Rightly enough, the obstetrician or the

physician supervising a confinement has far more thought of the mother than of the child. Naturally, the mother should receive first consideration, but obstetrical doctrine does not take sufficient cognizance of the actual injury inflicted upon the child, and often the child's entire life is affected by improper obstetrical methods at the time of delivery. Many years ago, Sachs and Peterson showed that tedious labor is more disastrous to the child than is instrumental delivery. Prolonged compression of the skull, protracted dry births, and unskilful instrumental delivery are responsible for many infantile cerebral palsies, especially the monoplegias, the hemiplegias, and the double hemiplegias with subsequent idiocy and epilepsy. There is a tendency at the present day to minimize the importance of these factors. Allowing for the fact that the case may have been slightly overstated and, as F.R. Ford[1] has recently shown, that the cerebral diplegias are not so frequently due to birth injuries as was supposed to be the case, yet the preponderant weight of evidence is still in favor of the enormous harm that can be done to the skull and brain of the child by improper obstetrical manipulation. It would seem rather preferable to exaggerate this point than to lessen the responsibility of the obstetrician and the family physician in the matter of prompt and safe delivery of the child. That firstborn children are the most frequent victims of cerebral birth palsies is a forcible commentary on the effect of "prolonged compression of the skull." If the physician is reminded of the fact that the occurrences immediately before and during delivery not only may result in various forms of paralysis, but may lead to something that is far worse, to chronic epilepsy and idiocy, he will realize to the fullest extent his obligation toward the child that he is helping to bring into the world.

[1] Ford, F. R., Birth Injuries of the Central Nervous System, Part 1. Medicine Monograph 9.

The so-called "obstetrical palsies" are surely among the avoidable diseases. Without wishing to criticize the medical attendant too severely, and certainly with no desire to intimidate him, there is no harm in stating that the brachial plexus of an infant is made up of delicate strands, and that undue traction upon the arm or arms should be avoided. While the lumbar and sacral plexuses are not so easily lacerated, traction upon the lower extremities does occasionally give rise to serious palsies, and recently Crothers and Putnam have shown that even serious cord injuries may result from improper manipulations at birth. Their statistical evidence is interesting.[1] In a large series of cases, there were 26 definite "cord cases," while the uncomplicated brachial palsies numbered 216 and the cerebral palsies of birth origin were 260. While these figures may be subject to all sorts of errors, as the authors themselves allow, they emphasize the importance of avoiding undue traction upon the lower extremities as well as the upper. While a more favorable impression is given of the relative safety of forceps delivery, passing allusion must be made to the occurrence of facial palsies due to compression of the peripheral portion of the nerve by the blade of the forceps. Although this is a recoverable condition in many instances, it is surely to be classed among those that may be avoided. The modern obstetrician has so often been accused of undue haste rather than of delay, that it seems just as well to state, that so far as present evidence goes, the child seems none the worse for the "haste." Summing up this especial division of the subject, it is clear that much could be accomplished in the prevention of the development of infantile palsies, cerebral, spinal, and peripheral, of idiocy, and of epilepsy if the attention of the attending physician or obstetrician were more closely riveted upon the condition

[1] Crowthers, Bronson and Putnam. Cord Birth Injuries. Part II, p. 159. Balt., Williams & Wilkins, 1927.

of the child and not too exclusively upon the fate of the mother.

Idiocy and Imbecility. There are so many different forms and so many different causes of idiocy and imbecility that it is not possible to lay down general rules of prevention. Those due to factors operating before or during birth have been alluded to, and for those due to faulty heredity, the only hope of diminishing their number lies in preventing marriage between individuals of tainted stock, or in exercising birth control with a view to checking the recurrence of mental disorders in later generations.

Infectious Diseases of the Nervous System. Many of the general infectious diseases of childhood are apt to have neural sequelae, but those of special concern in this instance are the few infectious diseases that have a particular predilection for the central nervous system. Among these are acute anterior poliomyelitis (infantile paralysis), occurring most frequently in children, but also in adults, epidemic cerebrospinal meningitis, and epidemic encephalitis (encephalitis lethargica). In the prevention of these acute infectious diseases little attempt was formerly made to isolate those afflicted with the disease, since the danger of infection was not supposed to be great. Epidemics within recent years have taught us that it is wise to isolate patients suffering from these forms of disease, in spite of the fact that in several of the diseases mentioned the actual infective organism has not yet been definitely discovered. Cerebrospinal fever is due to a meningococcus (diplococcus). Both poliomyelitis acuta and encephalitis lethargica are probably due to a filterable organism, the exact characteristics of which have not been definitely ascertained.

In experimental poliomyelitis the virus rarely persists after three or four weeks. Isolation of a period of one month has been suggested in the case of infantile paralysis, and this

same period would be a safe one to establish with regard to the other epidemic diseases. Medin showed very conclusively that the school was a source of infection from which the cases of poliomyelitis seemed to radiate, and for that reason it is wise not only to isolate children in the family, but to close, for a few weeks, schoolrooms and schoolhouses in which one or more cases of these infective disorders have occurred. In our hospitals in this city, during epidemics of encephalitis lethargica and of poliomyelitis, very few cases have occurred positively demonstrating the direct transmission of the disease. Occasionally physicians and nurses in attendance have been stricken down with one or other of these diseases and, although evidence is not conclusive that the infection was actually contracted in the hospital wards, there is sufficient reason for demanding isolation of the patient. Those who are exposed to possible contagion will do well to use antiseptic throat sprays and gargles. It is probable that the infectious organisms find their chief portal of entry in the air passages. There is good reason to believe that many apparently healthy individuals are "carriers" of these diseases, and, as McNalty has pointed out, abortive types of all these epidemic forms are so slight as often to elude recognition. Newman[1] insists that in cerebrospinal fever "overcrowding and fatigue are predisposing conditions." This same author, quoting Sir Humphry Rolleston, states that, in the British Navy, the use of antimeningococcic serum helped to diminish the mortality from this particular disease.

Prevention would seem to justify the remark that the early and proper care of the patient suffering from any of the infectious diseases of the central nervous system plays an important part in the restriction of the sequelae which are often far more disastrous than the original disease. In the

[1] Newman, Sir G., An Outline of the Practise of Preventive Medicine. London, 1926.

way of prevention it is important to prolong the bed period until every vestige of inflammatory process has disappeared and to guard the patient against the development of contractures and chronic paralytic distortions. For details, the physician must consult special neurological textbooks. Whether anything can be done to counteract the disastrous sequelae of epidemic encephalitis is a matter that must be left to further research. It is to be hoped that the researches, now in progress in this country and abroad, will lead to the preparation of vaccines or therapeutic sera which may lessen the incidence of these epidemic and infectious diseases of the central nervous system, and which, if given early in the disease, will make them less virulent, and mollify, if not prevent, the many disastrous sequelae of these various scourges.[1]

Syphilitic Infections of the Nervous System. In the earlier pages of this chapter attention was called to hereditary lues and to the duty of the parent with a syphilitic taint toward the unborn child. Syphilis may, however, be acquired at any time of life. In childhood, syphilitic infection is relatively rare, but every physician recognizes the importance of safeguardingt he infant against wet nurses who may be diseased (a positive Wassermann reaction will exclude a certain number) and against diseased children's nurses who are certain to come into intimate physical contact with their charges.

Syphilis is surely a protean disease but it appears to have special predilection for the central nervous system. Fordyce, Wile and Stokes, Cannon, and a number of other reliable investigators have shown that there is distinct evidence in many cases of involvement of the cerebrospinal fluid within the first year after the initial infection. Taking the lowest

[1] What has been attempted in this direction may be gathered from the publication of the Association for Research in Nervous and Mental Diseases on Acute Epidemic Encephalitis (N. Y., Hoeber, 1921); also from the writings of Levaditi and others.

estimate (that 25 to 73 per cent of all syphilitics develop neurosyphilis, as claimed by Wile and Stokes), early and vigorous treatment is essential directly the initial symptoms appear. This is not the place to discuss the proper method of treating initial syphilis; but so far as neurosyphilis is concerned it is to be assumed that everyone with primary syphilitic disease is a potential neurosyphilitic.

An occasional lumbar puncture for diagnostic purposes is permissible; but there is after all some risk in repeated lumbar punctures, especially in unskilled hands. Harm has been done too frequently by punctures; moreover, it is better to be guided by clinical signs and not merely by cerebrospinal content. Whatever the content may be, if a person who has had syphilitic infection develops any suspicion of central nervous disorder (a sluggish pupil, subnormal knee jerk or ankle jerk, or lightening pains), the antiluetic treatment should be actively administered; and for several years a series of courses of approved injections should be given. That there may be some difference of opinion as to the methods to be pursued in the treatment of syphilis of the nervous system is granted, but it is contended that in the early stages of a constitutional infection and before clinical signs have appeared, intraspinal treatment of any sort may do more harm than good. Cannon,[1] in a recent carefully considered paper, suggests as a minimum standard treatment, thirty injections of arsphenamine (or its equivalent in neoarsphenamine), and forty-five injections of mercury salicylate to be given over a period of nine or ten months, in order "to safeguard every early syphilitic against the dread results of nervous-system infection." A course of ten or twelve sulpharsphenamine or neoarsphenamine injections should be repeated at least three times a year for several years in the

[1] Cannon, A. B. Standardized treatment in early syphilis as a means of eliminating neurosyphilis. *N. York State J. Med.*, Nov., 1927.

case of every individual who has shown the first signs of syphilitic nervous disease. Such therapeutic procedure will guard against the development of the more serious forms of syphilitic nervous diseases, among which must be classed multiple cerebrospinal syphilis, locomotor ataxia, and general paresis. Now that successful sulpharsphenamine treatment can be given intramuscularly there is no reason why any physician in town or country should delay vigorous treatment at the very earliest period of the constitutional infection. The good effect of sufficient initial treatment is made evident by the diminishing number of cases of tabes dorsalis and of dementia paralytica and by the milder and more protracted courses these very diseases run as contrasted with those in former years. In 1915, according to British statistics, the death rate per million was 63 general paretics and 21 cases of locomotor ataxia; in 1923, these figures were 44 and 19 respectively.[1]

General paresis is known to be of syphilitic origin. In the matter of prevention, therefore, what has been said of locomotor ataxia applies with special force to this disease. Early vigorous treatment is essential and the good results obtained from it are distinctly in evidence at the present time. The whole aspect of the disease has been changed since the introduction of modern antisyphilitic treatment. The typical cases that were so frequent in former years with very extravagant delusions of grandeur together with a rapidly developing dementia, cases that ran their course within two or three years, are far less frequent than they were: and when the disease does develop, it seems to run a milder and much more protracted course. Everyone has known cases that have already run a course of twelve and fifteen years, but now that the malaria treatment promises to be so effective, the question should be considered as to whether every patient who

[1] Newman, Sir G. An Outline of the Practise of Preventive Medicine. Lond., 1926, p. 59.

has had constitutional syphilis and who shows signs of mental disturbance should not at once be given the benefit of the most approved antisyphilitic treatment and also of malarial inoculation. On the other hand it is well to state that not every mental disturbance in a syphilitic necessarily implies the development of general paresis. At all events the attempted prevention must precede the attempted cure.

Apoplexies of Adult Life. The vascular disorders underlying these conditions are associated with cardiac disease, with arteriosclerosis, with constitutional syphilis, with renal disease, the special exciting causes of which are immoderate living, undue and improper exercise, excessive alcoholic indulgence. A program of prevention would necessitate a daily sermon as to the dangers ahead of those indulging in such excesses and the rewards attendant on careful dieting and the "good life." It is unreasonable to expect that a great deal can be accomplished in this respect in a short time; but the recognition of these facts and the early inculcation of habits of moderation may give greater promise.

Hereditary and Family Affections of the Central Nervous System. Among these are included Friedreich's disease, hereditary spastic paralysis, and amaurotic family idiocy (Tay-Sachs disease). If anything can be done to prevent the development of these disorders, it could only be in ruling against marriages between individuals coming from any family in which one of these diseases has been prevalent. As far as amaurotic idiocy is concerned, the disease is not transmitted directly, as the victims of the disease die at a very early age, and since absolutely healthy children are found in the same family and in succeeding generations, as is now established, it is questionable whether we could demand that the members of such a family group practise celibacy. As some of these supposedly hereditary diseases may be accompanied by endocrine disturbances, the question

arises whether with children of such families, the attempt should be made early in life, whether they exhibit symptoms or not, to decide as to the presence of any disturbance of glandular function. With the improved methods of determining this question (basal metabolism, etc.), early and intelligent endocrine treatment may be in order. Once the presence of one of these diseases is established, reasonable efforts may be made to counteract the disturbances in normal locomotion and the general use of the limbs.

The Progressive Muscular Atrophies. It would seem to be useless even to mention the prevention of these diseases. They belong to the order of family affections, a few of them being syphilitic in origin. In some, endocrine disturbances have been noted and what was said in the previous paragraph regarding family affections would probably be true of this special group. To offset the notion that nothing can be done to prevent the development of these diseases, it has been shown that in one very definite form (the peroneal form of progressive muscular atrophy), the disease can be stayed by early orthopedic measures; this is likewise true of other cases in which the progressive wasting of the muscles has been delayed or counteracted by carefully directed and persistent physiotherapeutic measures. Therefore, not even in these diseases is the physician to fold his arms and claim that nothing can be done. It may be mentioned here that Peaton and Farnell have reported a case of dystrophy improved by a diet rich in sugar, and Goldthwait has described a recovery from muscular dystrophy under mechanotherapy, which had the effect of facilitating the glycogenic function of the liver. It seems more than probable that studies along the lines attempted by Goldthwait and others will show that the use of epinephrine, pituitary extract, and other glandular substances may some day point the way to measures which, if they do not prevent the disease itself, will at least counteract

its devastating course. Let the physician, therefore, remember that there is some justification even in these diseases for the early use of orthopedic measures and of glandular extracts.

Chorea and Tics. These are a series of functional disorders which, to a very great extent, may be classed among preventable diseases. It may be impossible to prevent the development of an acute attack of chorea minor, since this disease belongs, in all probability, to the category of infectious diseases and is often a sequel to other acute infectious disorders (scarlet fever, acute articular rheumatism, endocarditis). On the other hand, fright, shock, or a slight overstrain at school precedes the onset so frequently, that children who are ill with any infectious disorder should be particularly guarded against any undue emotional excitement. Children are known to be imitative to a degree. Whence it follows that all children showing the slightest choreic manifestations should be kept from school and should not be allowed to play with other children. Once the chorea has begun, much can be done to check the disordered movements or at least to prevent the movements becoming riotous and exhausting. To this end absolute rest and dry packs (as a method of restraint) are essential. In a large hospital service we have seen the excellent effect even in severe cases, of asking the children to "play dead," which meant that they were to try to show how quietly they could lie in bed without stirring a limb.[1]

If self-control is important in acute chorea, it is the essential factor in the prevention of habit chorea and "tics." The trouble is that the physician is so often in doubt as to whether he is dealing with a habit chorea or a true chorea. The distinction can be made easily enough, and choreic habits can and must be "nipped in the bud." The troublesome and annoying "tics" of adult life (head movements,

[1] Sachs, B., and Hausman, L., Nervous Disorders from Birth through Adolescence. N. Y., Hoeber, 1926, p. 428 et seq.

tricks of speech, facial grimaces, shoulder movements) could have been reduced to at least one-fourth their number if sufficient pains had been taken to check these movements and tics at the very start. Some ingenuity and some wise therapeutic measures (mirror practice, for instance) may have to be instituted. The movements must cease and the patient must stop them before they gain control over him. After all possible sources of irritation have been removed, such as ill-fitting spectacles, irritating scars on the face or other parts of the body, ill-fitting collars and clothes, hair poorly cut and hanging over the eyes (these are only a few factors), when all these conditions have been adjusted, insistence on the cessation of movements and tics will be necessary. There is no need of "bullying" the child or youth, but persuasive measures of an effective sort must be employed.

Prevention of Other Functional Nervous Disorders. Many of the functional disorders may some day be included among organic nervous diseases. Chorea and epilepsy, for instance, are about to be transferred completely from the former into the latter group. Yet much may be done to check these disorders in their earliest stages and to prevent their becoming chronic diseases. Chorea has been discussed; it is equally important to consider convulsions seriously, to inquire into the possible exciting cause of each convulsive seizure, and by removing or counteracting such cause to prevent the development of epilepsy. Slight injuries, especially to the head, should not be disregarded; so called "fainting spells" and "lapses" may be the first manifestation of epileptic disease. In no other class of disease is a complete physical examination of greater importance.

In children and in adults, speech disorders, headaches, and insomnia are among preventable conditions. Much will depend upon the observance of sensible hygienic rules as to diet and exercise, and the proper psychic influences exerted

by parents and teahers; but for all these conditions, if they are not to become chronic and resistant, the attempt to curb must be made when they first appear. As for headaches, it may not be safe to generalize, since there are many different factors responsible for them.

Disorders of internal secretion play an important part among preventable diseases. Of late years the physiological functions of the thyroid gland, of the pituitary, of the adrenals, of the pancreas, and of the sex glands have been studied so successfully, that the use of these glands or extracts of them has acquired distinct therapeutic and prophylactic value. Myxedema, cretinism, cretinoid idiocy, hypopituitarism, various forms of distorted growth, and various sexual abnormalities have been held in check or have been arrested in their extreme development by feeding the individual with one or the other of these gandular products.

The subject has assumed such importance (no doubt somewhat exaggerated) that a careful endocrinological study of many nervous and neurotic individuals may be undertaken. Without making a fad of "basal metabolism" and of "autonomic imbalance," a study of these conditions will be helpful in the prevention of a number of diseases of disturbed nutrition and of abnormal growth.

Neuroses, Psychoneuroses, and Psychoses. Viewed from the angle of prevention, the neuroses, the psychoneuroses, and the psychoses may be considered a unit. It matters not, whether the condition be a simple neurasthenia, an hysteria, a hypochondriasis, a psychopathic personality, dementia precox, or a manic depressive psychosis. In all of these heredity, or at least family environment, is supposed to play an important role. Often this view leads to a spirit of pessimism and inaction on the part of parents and physicians, but a fatalistic doctrine is the last one we should adopt, and to a very great extent it is a false premise. It is much more to

the point to assume that hereditary influences, if they exist, can be counteracted to a great extent, if not nullified, by a healthy environment. Let us consider every child at birth potentially normal and realize the powerful influence of environment and early training. It is especially important to watch with greatest care during the early and formative years of life over a child that is thought to be predisposed to any one of the neuroses or psychoses. I have stated elsewhere that outright mental derangement, barring idiocy and imbecility, is relatively rare in childhood; even the psychoneuroses are rare in young children. Yet many of the candidates for grave mental disorders are recognizable in their earliest years and should be studied and handled with discriminating care. Every physician of experience has known neurotic and also psychoneurotic stock. In children belonging to such groups the mental makeup, the character development, the social qualities, the adaptability in the home or in the school should be scrutinized most carefully. Any departure from the average or conventional standard should be viewed with suspicion and the necessary corrective should be applied at the earliest possible moment. Nine times out of ten, the needed corrective will be a complete change of environment. In the case of very young children this may mean taking the child out of its mother's hands and placing it under the care of a sensible nurse. As the child grows older a properly qualified governess or teacher may be substituted for the mother or father; and during the school period, placing the child in a school away from its home may be productive of the greatest good in preventing the development of neuroses or psychoses which are so often fostered by the home or family atmosphere. A physician who knows the family conditions favoring the outbreak of neuroses should have the courage, as he has the duty, to be frank and outspoken in stressing the importance of a change of method of

training and a change of environment. This is not a mere phrase; it is a prophylactic measure of the greatest importance. In the instance of a child born of a very hysterical mother, at the age of five or six years showing nervous symptoms of various sorts, it is well to apply the principles already suggested. "In the majority of cases the early training has been defective; the child has been witness to the behavior and misbehavior of an hysterical mother or some other hysterical relative. Naturally it imitates such performances. The first and most important principle of treatment is the absolute separation of the child from the family. The more intelligent parents can be made to understand that an utter stranger, if properly qualified, may train a child far better than its own mother. There is little use in instituting any form of treatment unless the hysterical child can be put under the influence, continued over a number of months or years, of a sober-minded, intelligent nurse or teacher who will devote himself or herself to studying the peculiarities of the child and who will make a serious attempt to influence its behavior along natural and proper lines." Should this be impossible "such a child should now be placed in a small special school or in a family providing contact with entirely normal and sensible children. It is in this class of cases that the old-fashioned strict discipline of the school-room is especially advantageous." The interests of such children should be "aroused in nature study and their reading should be carefully directed. . . . It goes without saying that the general physical development of the child must be carefully watched and that special care must be exercised when the age of puberty is reached. It is at this period that the calm judgment and the sober influence of teacher or parent or physician are imperatively needed."[1] What has been said of

[1] Sachs, B., and Hausman, L., Nervous Disorders from Birth through Adolescence. N. Y., Hoeber, 1926.

hysteria would be equally true as to the care of young persons suffering from other forms of neuroses. All these conditions can be handled successfully only if the attack upon them is made very early in life.

Of late years special stress has been laid upon the earliest recognition of mental abnormalities, in the confident belief that such recognition will lead to the gradual diminution of mental disease later in life. This is the basic thought underlying the Mental Hygiene movement. It is the reason for the child guidance clinics, for the careful personality studies, and for much of the psychological work that is now being attempted in the family, in schools, and in colleges. In all this work the guiding hand of the general medical man is needed, of the man who has the physical as well as the mental and moral development of the patient in mind, who knows not only the child or the youth but also the parents and their ancestry, who is willing to avail himself of such facts as the psychologist or the physiological analyst may provide, but who is also possessed of sufficient critical faculty to protect the patient against the many fads of the day.

The line of demarcation between normal and abnormal children is so uncertain that the principles which apply to the development of character in the normal child apply with special force to its development in those children who are predisposed by inheritance or by environment to even the mildest forms of nervous and mental disorders. It is with reference to the development of the mental and moral health of such children that such a movement as the one that is now undertaken in our Public Schools (through the agency of the National Child Welfare Association), known as the Knighthood of Youth, can be warmly endorsed. Such a movement as this, sensibly controlled and directed as it is, will do much to prevent the development of many of the minor neuroses. It is particularly fortunate that the children

of the poor as well as the well-to-do are to be equally benefited by the principles pursued by those in charge of this Knighthood of Youth. It will not be amiss to quote from the program of this association that its fundamental principle is "to develop individual character through practice of daily acts, to form habits of obedience, carefulness, promptness, self-reliance, neatness, courtesy, honesty, self-control, cheerfulness, kindness, good citizenship, and service to others." The parents of any neurotic child may consider themselves especially fortunate if their offspring can benefit from such a program as this, instead of being exposed to and influenced by the petty nagging methods that obtain in so many "nervous families."

There are a few conditions which call for special comment. Among these, the obsessions of early childhood deserve particular mention. These obsessions are supposed to originate without rhyme or reason. They are spoken of as imperative concepts, imperative impulses, and the like: but they are more often based upon some experience, sad or otherwise, that the child has had. A youngster who had developed a peculiar habit of doing everything three times (repeating sentences three times, touching the ground three times before jumping into bed) had developed this obsession after the death of his father when he was a boy of seven; he feared that his mother would be the next to die. Dreading, therefore, the number two, he would do nothing twice and preferred doing everything three times. This was the starting point of the obsession which it took years and years to correct. But if the effort had not been made to curb this obsession, the young man would have gone through life a hindrance to himself and a nuisance to others. So many individuals with abnormal habits are seen in everyday intercourse that the importance of checking such tendencies early in life cannot be stressed too strongly. Just as in the case of "tics," the

only hope of checking these tendencies is that they be attacked vigorously early in life.

Boys and girls in the school period and in early adolescence are prone to mild mental disorders. Many of them are moody, some are hypochondriacal, and a very considerable number are afflicted with a sense of inferiority, although this is by no means as common as recent discussions on the inferiority complex would lead one to believe. In all such cases, it is a matter of the utmost importance that the home and the school environment be examined carefully, and that the child's or youth's relation to his family and to the other pupils of the school be carefully determined. Personality studies will be most helpful provided that the person conducting them shows a proper sense of proportion and does not exaggerate acts and traits that are relatively unimportant. It is well to remember that every individual is expected to conform to conventional standards of behavior. If he cannot be made to conform to these, it would be well to inquire into the reason why a given individual differs from the average, and so far as possible conditions should be altered to meet the needs of this particular child; but it is well not to be too indulgent with incipient neurotics and not to make too much ado over the slightest peculiarity in the behaviour of the child. Some of the fads of the day, particularly the fear of "repression" and the fear of wholesome discipline at school, have encouraged the development of many of the minor neuroses. In the period of adolescence, both boys and girls should be given proper sex information, and in this the physician can be of the greatest possible help; but it is hoped that the greater number of physicians agree in the desire not to overstimulate the sex practices of boys and girls. In this connection, it may be stated that the physician will do well to frown upon self-abuse in either sex. Some physicians are known to be

curiously ignorant of or indifferent to the evil that comes of continued self-abuse.

Dementia precox and *manic depressive psychosis* are two forms of mental disorders in which family inheritance, possibly family environment, are to be considered the chief etiological factors. Can anything be done to prevent the development of these conditions? Every alienist of considerable experience has known dozens of such families in which, in succeeding generations, two or three members of a family have been thus afflicted. It will not be necessary to consider the differential diagnosis between the two conditions, nor is it easy to prove this matter by statistics, but manic depressive psychosis is even more definitely due to an hereditary taint than is dementia precox. In the latter, other extraneous factors may exert an influence equal to that of heredity. But in a family in which either one of these diseases has appeared again and again, every child should be given special care in its earliest years. If possible, it should be reared by strangers so as positively to exclude the effect upon it of an unwholesome family environment. On the one hand, the mother, who knows that she has herself been the victim of a manic depressive psychosis, is apt to be too anxious in the care of her child; and on the other hand, however carefully she may watch herself, more or less unconsciously she would have an influence upon the child. The children of such families should at the earliest possible moment be brought into contact with other entirely normal children, especially in the kindergarten and in the earliest primary school period. If economic conditions permit such an arrangement, it might be advisable that such children should, during the school period, be separated from their homes and be given careful training and discipline. The question is not, however, as simple as this, because in the development of every child, normal or abnormal, the mutual love between parent and

child should be maintained and fostered. I cannot conceive of any problem more important than that of leading the early training and education of children of neurotic stock along entirely normal lines. So far as dementia precox is concerned, one particular feature of these cases is impressive; many of them develop in the adolescent period when the first great strain in the struggle for existence is manifested, when the question of economic support first presents itself and the individual is apt to subject himself or herself to unusual efforts. This is particularly true when a supreme effort is made to rise higher in the social scale and when the boy or girls who works hard during the day also attends night school, does an inordinate amount of reading, and makes an extreme effort to improve mentally. It is under these conditions that dementia precox becomes manifest. While it may be argued and cannot be contradicted that dementia precox might have developed if such conditions had not existed, yet the one thing that can be done on the part of the physician is to make the individual or the parents of the individual realize the person's limitations as to brain power and the amount of physical or mental strain that he can endure. Not every boy is fit to stand the strain of preparing for college examinations and surely not all those who attempt to enter upon one or another professional career are fitted for such efforts. Some of our institutions have wisely adopted the plan of trying to determine whether or not a student has the ability to pursue the studies which he has elected, and some of the professional schools have had the courage to state frankly to applicants the fact that they do not seem to be properly equipped for the career they have chosen. If the candidates for colleges and for professional schools were more carefully directed into lines of work for which they are mentally and physically fitted, some, if not many, of the cases of dementia precox would be prevented.

Over-ambition and over-strain are as important factors in the development of psychoses as are careless living and excesses of all sorts. In all these matters the physician should be the wise counsellor. If he feels himself incompetent to give the necessary advice, the various social and other agencies that have been organized in many communities will provide proper counsel or at least direct the individual into what seems to be the proper channels.

Paranoia is not nearly as frequent a diagnosis as it was many years ago. Many of the cases that were formerly labeled paranoia now appear under the title of the paranoiac form of dementia precox, but a small group of such cases still remain and a considerable number of them are in individuals who have started out early in life with some minor peculiarities of behavior. Some may have been recluses, others might have been afflicted with a superiority rather than an inferiority complex, some have suffered especially in the early struggle for existence, and others have had life made too easy for them by over-indulgent parents. In the way of prevention of this special form of mental disorder little more can be done than has been advised with the forms already discussed. It was thought at one time that no good would come of trying to discuss delusions with a paranoiac. And yet such delusions are sometimes held in abeyance or at least mollified by discussion with a kindly interested physician. Attempts in this direction might surely be made when the disease has not yet reached its full-fledged form. In the early development of delusions of persecution, which are so characteristic of the paranoiac state, particular examination into all of the conditions and careful attempts to bring about a reasonable readjustment between the individual and his environment are entirely in order. This matter of adjustment to the environment is one that requires thoughtful consideration and much good can be done, as Dr. Bingham has shown, by study-

ing the peculiarities, the characteristics, and the home conditions of young women in high schools. It is more than possible that such careful consideration of all the factors that may possibly affect a developing mind will help to prevent the outbreak of serious mental disorder.

CHAPTER XIII

DISEASES OF THE NOSE, THROAT, AND EAR

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PREVENTIVE measures in nose, throat, and ear diseases on first thought seem so simple that one hesitates to transcribe such elementary ideas as I shall call attention to in this short chapter. On second thought, however, recalling what a variance in practice exists in such matters as blowing one's nose, the use of cleansing sprays, douches, etc., the maintenance of the proper temperature and humidity of the rooms in which we live; and realizing the difference in health and happiness which results from a proper regulation of these matters, I am tempted to record a few simple precepts which, from this point of view, may be helpful.

Infection by Inhalation or Ingestion.—Inasmuch as the nose and mouth are the portals of entry of everything inhaled through the nares, nasopharynx, larynx and trachea into the lungs and everything ingested through the mouth, pharynx and esophagus into the stomach and intestinal tract, one has only to contemplate the vast array of diseases which are acquired by inhalation or ingestion to understand why volumes have been and will be written, teeming with advice how to avoid such disasters.

The modern methods of preventing the spread of such communicable diseases as diphtheria, scarlet-fever, measles, whooping-cough, mumps, tuberculosis, smallpox, chickenpox, typhoid and other gastroenteric fevers, pneumonia, bronchitis, sore throats, the common cold, have taught us that all these and many others are invariably acquired by direct conveyance to the nose or mouth of the specific cause of each individual disorder.

It is being daily demonstrated in hospitals for contagious diseases that cases of measles, scarlet-fever, and diphtheria may be kept in the same ward without cross infection provided that *meticulous care* is observed on the part of attendants not to carry the contagion from one to another, and that the beds are from eight to ten feet apart and separated one from the other by glass partitions six to eight feet high.

Realizing the importance of this fact it can be readily seen how a practical application of the principles involved can work for an immense prophylaxis. For example, if parents, nurses, and schoolmasters would all unite in an effort to curtail the common practice among children of exchanging pencils, pens, erasers, crayons, chewing-gum, lollypops, jew's harps, whistles, harmonicas, and many other articles which are conveyed from hand to mouth, it is conceivable that thousands of cases of communicable diseases might in this way be prevented.

The promiscuous use of drinking cups and eating utensils has been in a large measure stopped by propaganda aiming to lessen the spread of tuberculosis and syphilis. This has effected undoubted benefit to the public in the saving of health and life, by curtailing one of the large sources of dissemination not only of these but, in addition, many other forms of communicable diseases. In like manner, the education of the public in the practice of sneezing, coughing, and spitting into handkerchiefs, or some suitable receptacle, has already done much, and will do more as the habits and manners of the masses improve, to prevent the spread of diseases acquired through the nose and mouth.

Teaching everybody the importance of thoroughly washing the hands with soap and water before eating will do much to prevent conveyance of germs by food from hands which have been infected. This is a most important precept to

inculcate into the minds of school children and nurses. The habit of using a toothbrush two or three times daily should be more generally taught by parents, nurses, and schoolteachers, not only on the ground of the preservation of the teeth, but also because this form of cleanliness helps to prevent many infections of the throat and the gastroenteric tract.

It must also be borne in mind that the practice of kissing is a frequent source of direct contagion of many communicable diseases. This is particularly true of the common cold. Many parents and children and friends who are given to this affectionate method of greeting one another, and who would refrain from it in more severe forms of illness, either carelessly or unwittingly transfer their common colds or mild attacks of influenza by kissing. A wide dissemination of the knowledge that the conveyance of a very mild infection from the donor, by this method, may lead to a most virulent one on the part of the receiver, will result in much good.

Catarrhal Deafness. The question of prophylaxis in diseases of the ear can hardly be separated from that of the nose and nasopharynx. As a matter of fact, the nose and the nasopharynx with the eustachian tubes leading thence to the tympanum are quite essential to normal hearing. Slight changes from the normal in this ventilating mechanism of the middle ear always cause an impairment of hearing which often in addition is accompanied by distressing and distracting noises. All stages of the so-called catarrhal types of deafness, ranging from very slight to very marked impairment in hearing, are primarily brought about through alterations in this important mechanism of ventilation.

In the early stages this may be by occlusion from a swollen or engorged mucous membrane, varying from a slight catarrhal engorgement to a severe inflammatory swelling

from a virulent infection. Any alteration sufficient to impede in the least a complete change of air in the middle ear at each act of swallowing will to that extent impair the function of hearing. Complete occlusion of the eustachian tubes produces a very marked impairment of hearing for all except the very high-pitched sounds. One seldom sees a complete stoppage of the eustachian tubes, but neglected cases produce all types of variation from the normal, and, in the course of years, permanent changes in the lining membrane of the tube and middle ear take place from hypertrophy or swelling, which are not easily remedied, as they may be in the early stages.

All this large class of so-called catarrhal deafness, resulting from mechanical disturbances affecting the ventilation of the middle ear, may be entirely cured, or greatly improved, or very slightly improved depending upon the time the trouble is discovered and the amount of relief afforded to the mechanical interference with the proper ventilation of the ear.

A large majority of the school children suffering from impaired hearing fall into the class of those who can be cured or greatly benefited by the relief of obstruction to the ventilation of the middle ear obtained by removal of adenoids and tonsils or the correction of the obstructing malformations in the nose. For complete relief from this form of deafness early recognition and removal of the obstruction, before permanent thickening of the lining membranes of the tube and tympanum takes place, is important.

A widespread investigation of school children has now been instituted in many large cities by which these potentially deaf children are discovered and relieved early enough to prevent a life-long impairment of hearing. The dissemination of this idea should be carried out everywhere. The very fact that this class of cases represents the type which is susceptible to the greatest relief in all stages, always depending upon the amount of removal of the conditions interfering

with the mechanism of the middle ear, has furnished the main lever by which the charlatan has exploited his victims.

All otologists are quite aware that their brilliant successes in the way of relieving or curing deafness have come in this type of case and their success has been pari passu with the promptness and completeness of the restoration of the ventilation accomplished by their efforts. Even a bungling effort is rewarded by relief in just this proportion. Therefore the charlatan is bound to have varying degrees of actual improvement in all such cases that come his way. Trading on his successes, if he has any skill at all, he is able to persuade others suffering from forms of deafness, which do not call for such remedial efforts, to undergo unnecessary operations.

Mechanical obstructions in the nose and nasopharynx may also play a rôle in the development of ear conditions which, while they may eventually be important from the point of view of impairment of the function of hearing, are immediately of importance because they have produced a surgical condition which is not only distressing but may develop complications which are even a menace to life.

All infections of the nose and throat are very prone to extend to the middle ear by way of the eustachian tube. While this may be a result of a direct extension of an inflammation along the mucous membrane lining the tube, it is much more liable to happen by the mechanical means which nature has provided for the exchange of air in the middle ear at each act of swallowing, or by producing inflation of the tube by violent blowing, coughing or sneezing through an obstructed nose, thereby forcing infected mucopurulent fluid through the eustachian tube to the middle ear.

The moment infection finds its way to the tympanum a violent inflammation is set up, causing a middle ear abscess with all its attendant danger of mastoiditis or even intracranial complication.

Hygiene of the Nares. This leads to a consideration of the causes of such complications which in the main may be avoided. Perhaps the most common cause of infection being forced into the ear is an improper or too violent blowing of the nose. That there is no fixed formula for this act so commonly practised from early infancy to old age is quite evident. That there is great danger in the act improperly carried out needs no proof to those familiar with its disastrous consequences.

The public goes on blowing its nose from its own formula varying from the blast of a fog-horn by some plethoric individual, which might be heard to the most remote corner of a great auditorium, to the ineffectual dabbing of her proboscis by the debutante fearing she will disturb her neighbour in the front row of a theatre. Practically all of them have been trained in their art by advocates of different forms of practice. Hardly a day passes that I am not called upon by an anxious mother or nurse, who ardently desires that the youngsters under her supervision shall be properly coached in the function, to know whether it should be done with one or both nostrils open, or closed, or alternately opened and closed; into a handkerchief, like the rich man, or into the wide-world, like the tramp. To be perfectly accurate one might answer these questions by saying either is correct, or either is incorrect practice; for it all depends in each individual case upon the patency of the nose, and the patency of the eustachian tubes. What one should aim at, if one wishes to be safe, is not to blow with sufficient violence to force infected mucus through the eustachian tube into the middle ear. If one side is sufficiently patent, compressing the other, one may blow (gently enough not to open the eustachian tube) and thus expel the mucus from that side; and then reversing the compression, repeat with the other side. On the other hand, if either or both nostrils are so closed that an effort to expel the mucus with either or both sides uncompressed will result

in forcing some of the infected mucus into the eustachian tube, the practice in such a case would result in the very accident we are aiming to avoid.

If the public were instructed as to what was to be avoided in the act of blowing its nose, viz., that it should not blow with sufficient vigor to inflate the ear drums by forcing open the eustachian tubes, many cases of ear abscess and mastoiditis might be prevented.

When the nose or nasopharynx is so obstructed that it cannot be cleared by a moderate blow, which will not at the same time inflate the ear, such a nose should not be blown. It is not only unsafe: it is very dangerous. I have repeatedly seen parents and nurses, who would "go around Robin Hood's barn" to avoid taking a chance of exposing their charges to infection, urge these same children to blow their noses with such violence that they could hardly avoid inflation of the eustachian tubes each time. Such practice is bound, at some time, to infect the middle ears. One only has to wait for the event when a little mucopurulent fluid laden with bacteria is forced into the ear by the blast.

Obstructed noses during a cold should be kept as patent as possible by a mild saline antiseptic solution sprayed in frequently, a little at a time, snuffed back through the nose and "hawked out" and expectorated. The well-grounded notion in the minds of many that clearing the nose by snuffing back and "hawking" the mucus from the nasopharynx is dangerous" because it is liable to pull it into the eustachian tube" is entirely fallacious. On the contrary, it always has a tendency to clear the mouth of the tubes.

While we are discussing this subject, we may as well at this juncture discuss the question of sprays, ducks, nasal douches, snuffing of solutions through the nose, etc. In order that we may thoroughly understand the premises for the discussion, we must first of all bear in mind the mechanism

(which I have alluded to before) by which the ears are ventilated through an exchange of air at every act of swallowing.

This phenomenon takes place by a complicated muscular action which closes the passage between the pharynx and the nasopharynx and, at the same time, opens the eustachian tube by separating the walls which lie together, closing the tube except at the instant of swallowing. As the tube opens the air rushes in. Now, if the space in the nasopharynx into which the eustachian tubes open happens to be filled with fluid instead of air, the fluid is forced into the middle ear by the same mechanism which normally causes an exchange in the column of air. Should this fluid carry in suspension infected mucus, or mucopurulent fluid, the middle ear rapidly becomes infected. In my experience such infections almost invariably eventually involve the mastoid cells.

It can be readily seen that two factors are necessary for this accident to occur, viz., (1) the nasopharynx must be filled with a column of fluid; (2) the act of swallowing must take place in order to force this fluid into the tube. Therefore, if the nose is cleansed by the use of a spray, frequently interrupted after a few puffs and the column broken by snuffing back through the nasopharynx, there is no possible danger of fluid charged with infectious material being forced into the middle ear. If one stretches the mouth open while spraying through the nose it is practically impossible to swallow; this affords an additional safeguard and should always be done, the mouth being kept open until forcible snuffing back has cleared the nasopharynx. This method makes cleansing of the nose by spraying or dropping a few drops of fluid into each nostril perfectly safe.

However, when a large column of cleansing fluid is passed through the nose from one side to the other, as is done with various cups, ducks, and douches that are frequently employed, the danger of forcing fluid laden with infection

into the middle ear is tremendously increased. This is particularly true when the patient is not aware of the great danger to which he subjects himself by swallowing while the fluid is passing through the nasopharynx from one nostril to the other. I have frequently questioned victims of the accident (while using douches, cups, or ducks) as to how it happened, and have been told that they were aware that they should keep the mouth open, but that *why* this should be done had not been explained to them, and that, feeling a little strangled by the fluid, they had unconsciously *closed the mouth* for an instant in order *that they might swallow*. In the language of the mathematician, *quod erat demonstrandum*.

In other words, the use of nasal douches, cups, etc., for cleansing the nose, while it is a most efficient method of cleansing, is a difficult manœuvre fraught with great danger. Even clever adults, well aware of the danger and practising the trick *secundem artem*, are liable to make a mistake: children are almost certain to do so and the consequences are liable to be disastrous. No year goes by that I do not see several cases of mastoiditis which have been caused directly by this method of cleansing the nose. I therefore always advise against its use, preferring the less efficient though far safer method described above.

Dangers to the Ear in Swimming. This question of a column of fluid in the nasopharynx may as well be pursued to a finish. One is often asked: "What are the dangers to the ear in swimming and diving?" They are largely those that have just been described. The head is immersed; the water gets into the nose in a solid column; the victim swallows or blows violently against this column. As a consequence, a solution of infected material from the nasopharynx is forced into the middle ear with its train of disastrous consequences. The only difference in this instance is that it may contain, in addition to one's own bacteria, those of the companions in the swim-

ming pool; the more confined the pool, and the more numerous the bathers, the more varied the mixture.

If after immersion the bathers could always remember to snuff back through the nose, thus breaking the column of fluid in the nasopharynx before swallowing or blowing, there would be very few cases of middle-ear abscess and mastoiditis from bathing. The trouble is that there are many who do not know; and that those who do know do not always apply their knowledge any more than they do in using a nasal douche.

Speaking of swimming, another entirely different prophylactic measure might be more universally adopted, namely, stuffing bather's wool in the external canals before diving or swimming. The entrance of water to the drum, and rapid cooling of the static apparatus (the external semicircular canal of the labyrinth) occasionally causes such confusion of position that the victim goes to the bottom. This is much more liable to happen if there is a large perforation or complete absence of the ear-drum membrane which is often the case in chronic discharging ears. I have no doubt that this accident is much more frequent than is supposed, the drowning of the victim being attributed to "cramps" when in fact it was due to complete disorientation (loss of sense of position). A dog deprived of his static apparatus (the labyrinth of the ear), if placed in water, immediately sinks.

Atrophic Rhinitis. The thought of douches and sprays for the nose so naturally suggests the condition which most frequently calls for them that we might appropriately take up the question of so-called dry catarrh or atrophic rhinopharyngitis. Just as in children, adenoids and tonsils combine with the various acute contagious diseases and the common cold to form the vicious circle of nose, throat, and ear diseases, varying from mild forms which may cause only an impairment of hearing to severer ones which bring

about a surgical menace; so in adult life this "bogie" of "dry catarrh" looms up.

There probably never was a more misleading name given to a condition than when atrophic rhinitis was called "dry catarrh." The normal mucous membrane of the nose is constantly bathed in fluid which is so watery in consistency that it continually flows on and is swallowed with the saliva. In dry catar h, the actual volume of mucopurulent fluid coming from the altered mucous membrane is far less than the watery secretion in a normal nose. The mucous membrane is "dry" in the sense that it is not constantly dripping a fluid the consistency of normal salt solution, but instead, a mucoid fluid filled with white blood corpuscles.

This sticky fluid remains in situ until blown out from the nose or "hawked out" from the nasopharynx as a bolus. In later stages, as the amount of fluid becomes less and less, the constant breathing over this mass dries out the surface, and crusts form which remain for long periods. Now this sticky mass, remaining in a state of rest at just the right temperature, makes an ideal culture medium in which to cultivate bacteria. In other words, the whole labyrinth of the nose and its accessory sinuses and the nasopharynx are converted into a laboratory for the culture of bacteria which may have happened to be present, or may be inhaled.

Let us say that two people attend a theatre; one has a normal mucous membrane, the other has an atrophic rhinitis. Someone in their close proximity coughs or sneezes into the air they are breathing. Both inhale a liberal quantity of bacteria. One becomes infected and has a cold in the head, ethmoiditis, sinusitis, or what not, the other gets off "scot free." Why? Because the one washed the bacteria along so hurriedly that there was not time for them to multiply; the other, with his sticky secretion furnished an ideal culture medium at rest, which in the course of twelve to twenty-four

hours had multiplied the planted bacteria into millions, and which in this growth had caused a sharp inflammatory reaction in the mucous membrane.

This lengthy recital of what takes place in cases of atrophic rhinitis has been made in order that we may arrive at a better understanding of prophylactic measures which I wish to recommend to avert many of the distressing sequelæ which results from these infections.

All who suffer from this very common ailment are much "like a fish out of water." They are struggling for more moisture, and often, like the fish, they are wriggling around without any efficient method of procuring the great desideratum. All such sufferers should supply the moisture which is demanded by frequently spraying physiological salt solution into their noses. This relieves their discomfort and congestion, and, by "moving on" the accidently inhaled bacteria with which they constantly come in contact, prevents the inflammatory reaction in the nose. In my experience normal salt solution is infinitely better for this purpose than antiseptic sprays, ointments, or paraffin oils.

In addition to this they should keep the air in the rooms in which they spend most of their time, saturated with moisture from steam. They would thus avoid their attacks of hoarseness, which come on each winter as soon as they close up their windows and turn on artificial heat, which reduces the percentage of moisture in the air tremendously. To add to their burden of supplying, with a much incapacitated mucous membrane, moisture to the air they breathe to bring it to the point of saturation, is more than they can endure. In other words, no preachment can do more for sufferers from dry catarrh, in the way of solid comfort plus the probability of escaping many serious surgical complications, than living in an atmosphere moist to the point of saturation; and, in addition to this, spraying into the nose,

a little at a time and many times a day, physiological salt solution accurately prepared.

Two other simple matters in connection with the ear, the neglect of which may be far-reaching, occur to me.

Earache several decades ago was regarded as much a part of childhood as growing pains; both to be treated, if not with indifference, certainly with a degree of tolerance which was reprehensible. Growing pains have long since been relegated to a proper place by pediatrists who seek for the sources of infection from which they come. Earache, too, has since my time in Otology been treated with more respect than during my childhood, and yet it has been slow in taking its position as a condition to be respected for its latent possibilities of serious mischief.

The position I should like to see the laity and many general practitioners assume toward earache is one similar to that which they now have to acute pain in the abdomen. It may be very serious, and early recognition of its seriousness may be the means of averting, by a comparatively simple measure, very grave consequences, even the death of the patient.

The day has long passed when one's duty toward an earache has been fulfilled by pouring a little hot oil in the ear or placing a hot onion on the outside and waiting for developments. The only safe thing one can do for an earache is to send for a competent man to look at it and assume the responsibility for it. If such a competent man is not immediately available, instil hot water (110°F.) dropped in with a medicine dropper every hour, and apply a hot water bag while waiting. Practically all general practitioners and certainly all pediatrists are able at the present time to examine the ear and do an early incision of the drum membrane or get a competent man to do it. This early relief, in cases which require it, is of such great importance in averting more serious consequences that it should never be neglected.

The practice of using ear-spoons to dig out "hardened wax" from the ears should be discouraged. It is unsafe and frequently brings about serious consequences. Ear wax should be removed only by some competent person by the use of an ear syringe made for the purpose, and the ear subsequently carefully dried out by pledgets of absorbent cotton.

The ear should be treated with as much respect as the eye. The old adage that "one should put nothing in the ear smaller than the elbow" is the wisest advise to follow.

CHAPTER XIV

DISEASES OF THE EYE

ARNOLD KNAPP, M.D.

THE eye diseases which can be prevented may conveniently be considered under the following headings:

I. Local eye diseases.
II. Eye diseases which are a part of a general disturbance.
III. Injuries of the eye.

I. LOCAL EYE DISEASES

Gonorrhea. In group I, among the infections, mention must be made of gonorrhea, which affects the human conjunctiva (a) in the new born and (b) in adults. In the former, the mother of the child is suffering from gonorrhea and the infection develops during the passage of the child through the parturient canal, or the infection is introduced into the conjunctival sac during the washing of the baby. If the cornea is involved, it may be destroyed within a few hours, and then total blindness results. If treatment is begun at the right time and properly carried out, it is always possible to control the disease and prevent blindness. It is to be regarded as a very definite error on the part of the physician if extensive ulceration develops while treatment is being carried out. Credé, the well-known Dresden obstetrician, made an epoch-making contribution in introducing his method of instilling a 1 per cent silver nitrate solution into the eyes of the new born after the eyelids have been carefully cleansed. This has resulted in reducing to a great extent the number of cases of ophthalmia, and in the countries where this treatment is obligatory the number of those blinded in infancy is almost negligible.

Women who are infected with gonorrhea should be treated in the last months of pregnancy. Infection during the birth can be avoided by cleanliness of the parturient canal and of the eyes of the new-born. The employment of Credé's procedure is an almost certain method of preventing purulent inflammation of these eyes. The head and the parts about the eyes of the baby should be cleaned with sterile gauze and not with the water used in the bath; then one drop of a 1 per cent silver nitrate solution is to be instilled in each eye. If discharge from the eyes develops, the child should be immediately put in charge of a physician conversant with ophthalmic diseases. Discharge from the eyes after birth is often lightly regarded by those in charge of the case. There is no greater fallacy, for it is the treatment in these early stages which prevents the development of corneal ulcers and possible blindness.

Gonorrheal ophthalmia of the adult is much more serious because the fundamental urethritis is an active, acute infection. Its virulence, therefore, is much more severe, and it is much more difficult to prevent the partial or complete loss of the cornea from ulceration with its resulting loss of eyesight. The infection takes place by the introduction of gonococcal pus into the conjunctival sac, by either contaminated fingers or linen, or finally from one diseased eye to another. While in the infection of the new-born both eyes are generally involved, in the adult the disease begins in only one, usually the right eye. Every adult with a gonorrheal infection should be warned of the danger of infecting his eyes with the discharge. Cleanliness is the first principle of prevention. If the slightest sign of an infection of the eye develops, the case should be immediately turned over to the care of an ophthalmologist.

Trachoma. Another infection which is particularly important is trachoma, though as a cause of blindness it is only of

importance when it occurs as an epidemic disease. As is well known, it is found principally in the Orient among the poorer classes, and among those living elsewhere under poor hygienic conditions. It occurs when many people live together in barracks, factories, penal institutions, etc. The trachoma infection is carried through the agency of conjunctival discharge and transmitted by the fingers, or indirectly through the use of towels, handkerchiefs, etc. Trachoma is a very chronic disease which in its beginning is often difficult to recognize, and later is difficult to cure rapidly even under the best of conditions.

It causes a chronic inflammation of the conjunctiva, with thickening of the mucous membrane, and is accompanied by the development of greyish-red follicles. The lid tarsus then becomes affected; the terminal stage is a cicatricial transformation of the conjunctiva, and the eyelashes are turned in on account of the contraction and deformity of the eyelids. The eyelashes scour the cornea, thereby causing ulcers. The cornea also becomes affected by the development of a vascular tissue which is known as pannus; at the margin of this, ulcers readily occur. The changes in the conjunctiva cause a closure and an atrophy of the mucous glands so that in the final stage the cornea dries out and becomes opaque.

Prevention consists in cleanliness and the careful avoidance of transmission of the infection by anything which is likely to come in contact with the conjunctival discharge. In places where the condition is endemic, frequent examination of all school children is an important step, because thereby the early presence of the disease will be determined. Then the other members of the family, or those who are living in the same house, must be examined. Trachoma should be notifiable by law and proper treatment compulsorily instituted. The removal of the follicles, the proper treatment of

the conjunctiva, and particularly improvement in the hygienic surroundings of the patient are of the greatest importance. The trachomatous patient in the infectious stage should be isolated and given appropriate treatment with general hygienic care.

Glaucoma. A very serious local disease which frequently affects the eyes and develops without known cause is glaucoma. It inevitably leads to blindness, unless treated. The diagnosis of this condition and also the operative treatment have made great advances within recent years. The improvement in the diagnosis consists in the recognition of the early symptoms through careful measurements of the fields of vision, particularly of the central field, by the method of Bjerrum. This enables us to recognize the earliest involvement of the fields of vision, which does not, as was formerly taught, consist in a contraction of the nasal periphery, but in the development of a scotoma which starts at the blind spot. The second important aid in diagnosis is furnished by the tonometer, an instrument invented by Schiötz, a Norwegian, which accurately measures the intraocular pressure.

Glaucoma is generally a disease of past middle age, beginning with the fourth decade. Correct treatment can cure it or generally arrest its progress. When the glaucoma is acute the eye is very red and so painful that the disease may be mistaken for acute iritis, and the systemic disturbance is so severe that the condition may be mistaken for a bilious attack. More frequently, glaucoma is chronic and its onset is so insidious that one eye is lost without the patient's knowledge and the loss of one eye is not recognized until the remaining eye becomes affected. The prodromal symptoms, consisting in cloudy or blurred vision, coloured rings about a light, and slight neuralgia, should be more familiar to the laity and to the general physician than they are. An unusual form of glaucoma is the rare condition in which it occurs in the child,

where it leads, on account of the elasticity of the ocular membranes, to an enlargement of the eye, so that this condition is generally spoken of as ox-eye, or buphthalmus.

In glaucoma, our endeavors must be in the direction of early diagnosis and the education that an early operation frequently results in a cure, or at least in the arrest of the disease.

Myopia. Of the refractive errors myopia is important, as it may lead to blindness because, owing to the enlargement of the eyeball, important structures at the posterior pole, namely the choroid and the retina, and the region about the optic nerve are unduly stretched, so that hemorrhages and atrophic changes frequently result; finally, in the myopic a detachment of the retina may be the cause of ultimate blindness. The true cause of nearsightedness has not been determined. The newborn child is generally not nearsighted. It is a condition which develops later in life, and it is particularly during the years of puberty that its advance is apt to be greatest, so that this is the time in which our endeavors to retard its progress should be most active.

There are many theories to explain the development of myopia. Steiger regards it, just as the development of the refraction of the eye in general, as a developmental or biological question. Many regard the principal cause as hereditary, consisting in an inherited lack of resistance of the sclera which results in a stretching, particularly under the influence of close eye work and the growth of the body in general. It has been shown that the number of myopes is greater in proportion to the grade of the school, and that in every school the number of myopes increases from the lower to the upper school years. The so-called school myopia is characterized by its remaining stationary when the bodily growth has reached its full development, notwithstanding that the close work with the eye continues through life.

Another cause for the nearsightedness consists in reduced vision, which may be due to astigmatism, congenital amblyopia, or opacities of the cornea.

As to myopia, heredity as a cause can, of course, not be avoided. A great deal, however, can be accomplished in arresting the development and the increase of myopia by education in the proper hygiene of the eyes during the school years. One of the most important steps in this direction is the proper position of the body during close work. The child should assume a normal upright posture, and the eyes should be at about 30 cm. (1 foot) from the desk. To insure the proper bodily posture, the desk and the chair should be correctly designed. The print of the textbooks should be carefully supervised. The letters should be of sufficient size, the print should be black, the paper white, with no glare, but smooth and of sufficient thickness. Illumination is another important factor. All close work should be avoided in twilight and when the artificial light is insufficient. On the other hand, prolonged exposure to, or working in, direct intensive sunlight is harmful to the eye. Illumination of the school rooms has been greatly improved in recent years, since a great deal of attention has been paid to this feature. The colour of walls and ceilings should be bright. At the same time, the direct sunlight should not be admitted into the school room. Artificial illumination should approach daylight as nearly as possible.

An important measure in the control of nearsightedness is the regulation of the hours of work. The work at home should be restricted in the greatest degree. Attention to the general physical development of the child is most important. It is frequently stated that myopia decreases with advancing years. This, of course, is wrong, and the only way in which a myope improves with age is that he does not require the ordinary presbyopic correction, which the normal or the farsighted individual does.

Many of these suggestions on the hygiene of the eye are applicable to eyes other than myopic eyes, especially as myopia is not nearly as frequent as *hypermetropia* and *astigmatism*. Myopia and other refractive errors should, of course, be optically corrected with glasses, which should be worn part of the time, or constantly, according to the conditions present. The determination of these glasses should be done by those who have studied medicine, and have devoted special study to ophthalmology. That does not mean that others cannot correctly determine glasses, but the correct diagnosis of a patient's symptoms or impaired sight requires the special study of one trained in medicine. That an uncorrected refractive error, or an anomaly of the ocular muscles is responsible not only for ocular fatigue but also for headache and various reflex disorders can be taken for granted.

Squint. The importance of early squint is not as generally recognized as it should be. Treatment should be begun early, the earlier the better, for if the turning of one eye becomes confirmed its sight weakens. In any case, it is not correct to say that the condition is of no importance and that the child will outgrow the squint, because if the eye is allowed to turn in, after a certain number of years it becomes weak and then remains weak for the rest of the individual's life. Squint can be corrected by treatment, which should be undertaken as early as possible. The refraction and, if possible, the vision of each eye should be determined, also whether there are any other possible causes for the squint.

The treatment of squint should be begun as early as possible and consists in the prescribing of glasses, which can be worn as early as the second year, and in stereoscopic exercises. A great deal can be accomplished by this means. Operation should not be undertaken until the condition seems incurable by any other measures.

Eye strain produces not only inability to use the eyes to a normal degree, but sometimes, in nervously constituted individuals, gives rise to peculiar nervous reflex disturbances. It is caused by a refractive error, often of low degree, especially in the form of astigmatism, or by an anomaly of the ocular muscles. The treatment consists in the prescription of glasses after a careful examination of the refraction, often with the aid of a cycloplegic; the muscular anomaly, in addition, requires muscular exercises, prismatic glasses, and occasionally operation. Ocular hygiene, the elimination of toxic foci (nasal sinusitis especially), and general bodily hygiene are of the utmost importance.

II. EYE DISEASES AS A PART OF A GENERAL DISTURBANCE

Non-infectious general diseases, like nephritis, diabetes, and arteriosclerosis, often lead to hemorrhages and exudation in the choroid and retina. As we do not know why the eye becomes affected in these diseases, prevention is difficult.

General Disturbances of Nutrition. There is a disease know as keratomalacia which affects children in their first year, causing destruction of the cornea. It is the result of improper or insufficient nutrition due to the absence of vitamin.

Infectious Diseases. The *acute* infections include diphtheria, measles, scarlet fever, whooping-cough, typhoid, cholera, malaria, erysipelas, influenza, and smallpox. These diseases cause changes either by their own individual germs or by their toxins, though the important factor is a defect in the general state of nutrition, whereby organisms which usually should be easily overcome can develop their destructive activity. Most of these diseases cause blindness through the development of corneal ulcers which leave scars. Diphtheria of the conjunctiva is either a part of a nasopharyngeal infection which extends through the lacrymal passages to

the conjunctiva, or is a direct infection of the conjunctiva. Blindness occurs through destruction of the cornea. This terrible disease has become a comparatively mild one since the introduction of antitoxin. It must not be forgotten that a membranous conjunctivitis may be very mild, but at the same time on transmission to others may cause a virulent outbreak of the same infection.

Among the acute infectious diseases there is a large group, like measles, scarlet fever, and smallpox, which occurs in childhood and causes blindness by destruction of the cornea. Many children's diseases cannot yet be prevented, but the spreading of the disease can be avoided by the isolation of the patient and the suspects. Cleanliness again is of utmost importance. It must not be forgotten that many eye diseases which occur in the course of a febrile disease are the result of the reduced general nutrition of the child.

Syphilis. Of greatest importance in the group of *chronic infectious diseases* is syphilis both in the inherited and in the acquired form. Not only can it injure the eye by direct action of its inciting organism, but through the intermediary of brain and spinal cord affections blindness may develop. A large part of those who are thus blinded have optic atrophy.

Recent advance in diagnosis with the Wassermann reaction and the enormous improvement in the serologically controlled treatment with the newer arsenic and bismuth remedies, in addition to the old mercury and the iodides, give us now much better results in those syphilitic lesions of the eye which are often intractable and always serious. A more systematic attempt should be made to prevent the development of congenital lesions, by treating not only the parents, but the offspring, which should be easier. Much has been accomplished in the social service line and with the aid of the dermatological clinics, in seeing that the treatment in the little patient with interstitial keratitis

is carried out to a definite conclusion and that the parents and the other children in the family receive the necessary treatment.

Tuberculosis. Another very serious chronic infectious eye disease is tuberculosis. As a frequent causative agent of serious eye disease it has been recognized only in recent years, and many diseases of the eye which formerly were regarded as idiopathic are now recognized as tuberculous. The tuberculous diseases of the eye which formerly were not correctly understood, and which continued with relapses until vision was lost, can now to a great extent be prevented by proper climatic measures, by treatment with tuberculin, artificial sun baths, roentgen rays, and improvement of nutrition. It cannot be too strongly insisted upon that the proper use of tuberculin, as proven by extensive experience, is never dangerous and frequently causes healing or definite improvement of this serious malady.

The frequency of ocular tuberculosis, though recognized by ophthalmologists, has not been generally accepted by internists, as the general physical examination of these patients is negative. The primary focus in this latent tuberculous process is a lesion of the peribronchial glands which is difficult to demonstrate with the roentgen-ray. A subcutaneous or cutaneous tuberculin test under these conditions is necessary. It goes without saying that after the healing of the ocular process the patient's general condition must continue to be watched, and treated if necessary.

Phlyctenular Disease. A great opportunity for preventive measures is offered by the so-called phlyctenular disease of the conjunctiva and cornea which occurs in scrofulous children and leads to repeated ulcers of the cornea and to permanent damage of the eyesight. The treatment is general rather than ocular, and by improving the hygienic condition of the child the process can be arrested.

Poisons. Poisoning through the long-continued action of certain agents is a frequent cause of blindness. These poisons are tobacco, alcohol, lead, carbon-disulphide, and arsenic. They exert their injurious action directly on the retina and on the optic nerve.

Tobacco is poisonous through its nicotine contents. The poisoning through tobacco can be acquired not only by smoking and chewing, but also by contact with tobacco plants. The amount of tobacco which is harmful is difficult to determine, because the quality of the tobacco is a factor, as well as the form of smoking (inhaling). Finally, the age and the constitution of the individual are not always the same. Nicotine has the selective action of picking out the ganglion cells in the retina belonging to a certain bundle of fibres in the optic nerve, the papillomacular bundle, which conveys the fibres to the yellow spot; and when it is affected, central vision is disturbed. A defect (*scotoma*) develops, which at first is only for the colours green and red, then white or other colours are attacked.

The poisoning by *ethyl alcohol* in liquor is similar, and they frequently are combined. In recent years a great deal of damage has been done to the eyes by *wood alcohol*, which causes sudden, and generally permanent, blindness. The poison of wood alcohol can be inhaled in the process of varnishing.

Lead may affect the sight by direct action on the optic nerve, or through damage of the circulatory system. The poisoning develops after it has been inhaled in a finely subdivided form or has been introduced into the body through the food when food is cooked or preserved in lead-containing vessels. Furthermore, those who work with materials containing lead may poison themselves while eating with their contaminated hands. One form of lead poisoning which is not generally known results from hair dyes which contain soluble

lead which can be absorbed through the skin, thus reaching the circulation.

Arsenic may act as a poison in those who work with it, or it may be absorbed when some of the newer remedies containing arsenic are used. The salvarsan group is less toxic.

Quinine, if taken in too large doses, may cause blindness through injury to the retinal elements.

Focal Infections. In the causation of severe affections of the cornea, iris and ciliary body, choroid and retina, and optic nerve, the rôle of focal infections is a definite one. These foci are to be found in the teeth, tonsils, accessory nasal sinuses, the intestinal tract, gall-bladder, the prostate, and female generative organs. Treatment consists in the correction of the infection, the elimination of the toxins by general measures, in the use of vaccines, the building-up of the health, and the increase of the bodily resistance, in addition to the local eye remedies.

III. INJURIES TO THE EYE

Owing to the complicated structure of the eye it is not strange that even slight injuries may cause blindness. Even if the wound is not originally contaminated, the eye, not only because of its exposure to the air but from its position in the conjunctival sac, is especially prone to infection; and furthermore the conjunctiva, like other mucous membranes, cannot be disinfected.

An injury to the eye, particularly a penetrating injury in the region of the ciliary body, even if it does not lead to a purulent inflammation, may cause that dreaded condition in the other eye, called sympathetic ophthalmia.

Many injuries occur during work. Others, particularly in children, are the result of playing with dangerous toys.

Injuries are subdivided into superficial and penetrating ones. Every perforating injury is serious, especially when the ciliary body and the iris are invaded. The injuries may be

produced by a sharp metallic particle, or by a blunt force, like a snowball, a stone, a blow of the fist, etc.

Burns of the face do not usually affect the eye, as the closure of the lids is so prompt as to protect the eyeball. Burns of the eyelids are treated in the same manner as any burn of the skin; the resulting contraction of the eyelids, if the burn is severe, cannot be prevented by any treatment, and must be ultimately corrected by a plastic operation, if the eye is likely to suffer from exposure. A severe form of injury is a burn with acids or lyes which usually leads to blindness.

Of great importance after an injury is whether a foreign body remains in the eye, because certain of these, like coppper and iron, owing to their chemical nature, cause a severe irritation. The point of entrance is often so small that it is easily overlooked and the foreign body is not discovered unless examination with the roentgen rays is made.

Prevention of Injuries. The laborer must be instructed about the dangers and the protection which he can employ against them. The preventive measures may be applied to the machine direct or be worn before the eyes in the form of spectacles. Protecting glasses are, however, not popular and carelessness remains a human quality.

The injuries to children, which are a very serious factor in causing blindness, are usually the result of carelessness and insufficient care on the part of the parents, who permit the children to play with dangerous toys and sharp and pointed instruments, like scissors, knives, etc. The serious nature of an injury to an eye, with the possibility of the loss of both eyes through sympathetic ophthalmia, should be impressed at every opportunity on the laity as well as on general physicians. The number of eyes lost from the use of toy revolvers, air-rifles, explosives, and, especially in this country, from fireworks on July 4th, is appalling and is a calamity which should be handled by legislative measures.

CHAPTER XV

THE ORAL CAVITY

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IN discussing the ills of any part of the human body it makes things easier to divide all the ailments to which flesh is heir into four main divisions. The following headings might, I think, help us in dealing with our subject in an orderly manner.

1. Malformations; congenital, acquired.
2. Diseases or inflammations.
3. Injuries.
4. New growths.

MALFORMATIONS

Cleft Lip and Cleft Palate. In taking up this subject we might mention first, the congenital deformity or defect called the clefts of the lip and palate. Brophy describes some sixteen different types of cleft palates and six to eight various classes of lip clefts. Clefts of the palate and lips are defects, due to a failure of union of the two halves of the parts at or near the median line. A great deal has been written regarding the etiology of these deformities, but as yet we are not certain regarding the exact exciting, or direct, causes. There are many predisposing causes, however, and in passing we would say that heredity, intra-uterine pressure, the so-called wasting diseases of the mother during the early months of pregnancy, uterine inflammation, and poor nutrition play a prominent part in the causation of these distressing malformations. Clefts of the lip may be associated with clefts of the bony arch and palate or they may involve

only the lip. This is true also of the palatal clefts, which may be accompanied by lip defects of various types. Cleft lips may be single or double and may cause considerable deformity of the nose, the nostril on the affected side being generally open or distorted. When a cleft of the lip is associated with cleft of the anterior part of the palate, there is generally considerable deformity of the nose, as the premaxillary bone is out of place by reason of its lack of union to the supramaxillary bone and the nose is drawn to one side. Clefts of the lip interfere greatly with the ability of the infant to nurse and this is one of the reasons given for early operation in these cases.

Clefts of the hard and soft palates are not so conspicuous to the eye, but they cause the patient to become conspicuous when talking, as his speech is, as a rule, very nasal in quality. Cleft-palate patients have great difficulty in eating, at times, as food stuffs, especially fluids, tend to regurgitate into the nasal cavity and come out on the face through the nostrils. If the cleft of the palate is not repaired, a chronic catarrhal condition is established in the posterior nares, pharynx, and tonsillar region which in turn causes an inflammation of the Eustachian tube, and this causes middle-ear diseases, resulting in impairment of the hearing. The above chain of events makes it important that all clefts of the hard and soft palate should be closed anatomically, as nature never intended that the nose and the mouth should communicate directly with each other. Their bacteria and secretions are different and when the bacteria and saliva of the mouth enter freely and constantly into the nose, inflammation of this cavity often results.

Another disadvantage that these people suffer from, is the free access of cold air into the nose. These patients are subject to frequent "colds in the head" and quite often have various sinus involvements. The above conditions may

be improved by plates or obturators, but no artificial appliance is as good as the anatomical restoration of the palate by a successful operation.

Treatment. It is of the utmost importance that infants having clefts of the lip or palate be examined shortly after birth by a surgeon who is very familiar with this condition, so that the proper time for operation may be decided upon. Many children have suffered needlessly for years, on account of not having the cleft lip or palate operated upon at the proper time. Most men who are doing this kind of surgery feel that the lip should be closed during the first few weeks or months, that the defect in the bony arch and alveolar process should be repaired during the first few weeks, and that the cleft of the palate should be operated upon during the second or third year. There are many reasons for the above statements; of course, each case presents its own particular problems, but the importance of an early examination by an expert in this line of surgery, is that each child should be given the best chance it can obtain in having these unsightly deformities repaired with the greatest amount of success. It is pathetic to see a sufferer from this deformity attain the age of eight or ten or twelve years or even adult life with the malformation uncorrected, because the parents have been told that the child is too young to have the operation performed.

Malformation of the Teeth and Jaws. Malformations and deformities of the teeth and jaws are very common in the human race, and probably more frequent amongst the more highly civilized peoples. Deformities of individual teeth are not so important as irregularities of the whole dental arch and of the jaws themselves, which are caused generally by abnormal positions of the teeth. Deformities of the dental arch often interfere with the proper functional exercise of the teeth and this leads to the development of different oral diseases. The primary function of the teeth is mastication

and if this is interfered with, the teeth and jaws cannot develop normally.

Heredity undoubtedly plays an important role in some deformities of the teeth and jaws. Large teeth inherited from one parent, and small jaws and features from the other, are believed to be the cause of frequent irregularities. But we cannot always state that the small jaws are not the result of lack of proper function of the teeth, which may inhibit the development of the bones to meet the normal physiological demands.

Development of the jaw bones, like that of other bones, depends largely on muscular action. In turn muscular action depends on the amount and degree of exercise the muscles perform in overcoming resistance. And the resistance overcome by the exercise given to the jaws depends, of course, largely upon the diet. The modern preparation of food tends to provoke less muscular activity in mastication and this lessened muscular function modifies the development of the bones to which they are attached. If for some reason the mandible fails to develop and remains shorter and narrower than it should be, the maxillæ are also affected and a V-shaped arch with over-crowding of the teeth result.

It is well to note at this time that the mandibular teeth erupt first and have, to a large extent, a directing influence on the position of the corresponding teeth in the maxillae. The important muscles of mastication are attached to the mandible, and besides the maxillae are not movable. Hence, the stimulus for the growth and development of these bones comes largely from the contact formed through mastication, that is to say, the occlusion of the upper and lower teeth. The force and extent of this contact depend a great deal upon the kind and amount of food the individual masticates daily.

Too long retention of deciduous teeth or their premature extraction will affect considerably the eruption of the

permanent teeth. The eruption of a permanent tooth may be delayed by an infected deciduous tooth, and the absorbed bacterial toxins may be detrimental to the enamel organ of the developing tooth. If the deciduous teeth are extracted prematurely, the space for the erupting permanent tooth often becomes too narrow and is forced into an abnormal position. Certain habits, such as thumb sucking, lip sucking, and mouth breathing, also have a decided influence upon the shape of the dental arches. Supernumerary teeth, again, may cause deformities in the dental arches, by deflecting the normal teeth, thereby bringing into play abnormal dental contacts.

Most of these deformities appear between the seventh and fourteenth years, and the child should be under careful observation during this period. Any deformity occurring after this period should be watched carefully, to ascertain whether or not it is caused by a new growth. The immediate effect of all dental deformities is an increased tendency toward dental caries. It is difficult to keep irregularly placed teeth clean and free from food decomposition and the formation of mucin plaques on their surfaces. The slogan, "A clean tooth does not decay" is based on truth.

There is a distinct relationship between the occurrence of narrow arches and of large tonsils and adenoids. Opinions, however, differ as to which is the cause and which the effect. Diseased tonsils and adenoids may, of course, result from other than oral causes, but, when present, they tend to promote mouth breathing which in turn tends to produce oral deformities.

If the dental arch is narrow and the palate high, the nasal septum cannot grow to its normal size without becoming deflected. Nasal breathing becomes difficult and the patient resorts to mouth breathing. This may cause hypertrophy of the tonsils and adenoids. All of this may be responsible for a fetid breath and an unhealthy mouth. Persistent mouth

breathing influences the further deformity of the upper jaw as it induces insufficient expansion of the arch.

Treatment. In the treatment of these conditions, it is most important to remove the causative factors. In order to attain the best results, the medical and dental practitioners must work together and understand each other's endeavors. It is important that children should carefully masticate their food which will give their teeth the right amount of exercise. This should be arranged for by the physician. On the other hand, great care should be taken by the dental surgeon of the first or deciduous teeth. These should not be permitted to become diseased, necessitating their premature extraction to prevent infection, for all septic or non-vital deciduous teeth must be removed promptly, to prevent septic absorption, local abscesses, and perhaps necrosis of the young developing jaw bones. On the other hand deciduous teeth should not be allowed to remain in the alveolar process too long, as their retention will, at times, cause deflection and malposition of the erupting permanent teeth.

When there is an established deformity of the dental arches, orthodontic measures should be instituted to correct this. It is quite difficult to state just when the orthodontist should be called in to correct dental deformities. The writer feels very strongly that the physical and mental health of the child should be carefully considered before exacting orthodontic procedures are planned. It is preferable for the child to have a slightly irregular dental arch and good mental and physical health, than a perfect arch and to be nervous and irritable and worried by appliances which he wants to get rid of. Of course, the above works both ways and it is a very nice point to decide what effect four, six, to eight years of tooth regulation may have on a high-strung, nervous child. Will the tooth correction in later life compensate for the amount of nerve strain that it has cost the child? This ques-

tion must be weighed carefully by the physician and the dentist.

There are many methods of correcting deformities of the dental arches. Space will permit the mention of only some of the most important procedures. We have the surgical method, whereby misplaced teeth are surgically freed from their bony and soft-tissue covering and brought into place by traction and then held there by means of a splint. Resection of the mandible for prognathism has been practised by some, with good results. There are also numerous ways and means of gradually expanding the arches by movable and fixed appliances, bringing individual teeth into the desired position, if not diseased. A deciduous tooth, however, should not be extracted, to make space for any other tooth than its immediate successor. The opinion of an expert orthodontist should always be obtained in cases of deformity of the jaws, and the treatment should be carried out by one who is familiar with this work. The correction of these conditions should be attempted only by one who has had considerable experience in this branch of dentistry, as dental caries and the death of the pulps may result from injudicious regulating of teeth.

DISEASE OR INFLAMMATION

Infections of the soft tissues that invade the free margins of the gums, called the gingivae, are quite numerous and are divided into the following classes by Goadby.

1. Simple traumatic gingivitis.
2. Catarrhal gingivitis.
3. Chronic gingivitis.
4. Hypertrophic gingivitis.
5. Atrophic gingivitis.
6. Mycotic gingivitis.
7. Necrotic gingivitis.
8. Noma.

Pyorrhea Alveolaris. This condition, sometimes called periodontoclasia or suppurative periodontitis, is closely associated with gingivitis, but it affects the periodontal membrane and its attachment and has a pathology, with clinical symptoms, that makes it of special interest to the oral practitioner.

The word Stomatitis is used, as a rule, to describe an infection of the mouth as a whole, but which may have its origin in the free gum margin. An example of such an infection is Vincent's stomatitis which may invade the gums at their dental margins and later spread to other parts of the buccal cavity.

Most cases of gingivitis may spread to the underlying adjacent tissues and in the majority of instances, have for their cause some form of microbe. The atrophic and traumatic forms of gingivitis are not at first bacterial, but often become infected secondarily. Necrotic, mycotic, and probably the catarrhal types of gingivitis are of bacterial origin. The chronic forms of gingivitis including the hypertrophic, are probably due to the great variety of bacteria that are ever present in the mouth.

Traumatic gingivitis is often caused by the tooth brush, as most tooth brushes are unclean and many are too stiff. The gum margins recede, the dentine is exposed, and the teeth then become sensitive.

The gum margins are apt to be abraded in certain areas where the necks of the teeth are more prominent and are exposed to more friction in brushing the teeth. There is no pus present, as a rule, but the teeth appear to be eroded at their cervical margins and little smooth depressions in the dentine are usually seen. This condition is found only on the buccal or labial aspect of the teeth.

There is an apparent atrophy or loss of gum tissue at the gingival margins. There may be a thickening of the inter-

dental papillae, but the gum margin overlying the neck of the tooth is generally thin and quite pale in color. There are many other causes of traumatic gingivitis and we might mention in passing, fractures of the teeth and alveolar process, ill fitting appliances, ligatures, tooth-picks, and other foreign bodies.

It is most important that patients should not use too stiff a tooth brush and should not apply too much force in its application. They should be instructed to brush their lower teeth upwards and their upper teeth downwa ds with a sort of circular motion that will tend to cleanse the interstitial portions of the tooth surfaces. Strong gritty tooth powders should not be used, but rather a mild paste that will not traumatize or irritate the tissues. Great care should be taken to prevent infection of the abraded surfaces. Dentrifices are, as a rule, of little value in the treatment of this condition and often it is best to swab the gums with a cotton swab on a stick dipped in a physiological salt solution.

Catarrhal gingivitis may occur at any age, but is generally associated with a catarrhal condition of the mucous membranes of the upper air passages. The mucous membranes of the gums and cheeks are generally swollen and shiny. Small herpetic patches may appear on the gums later. The gums are sore and the teeth feel loose and elongated. The gums do not, as a rule, bleed and they may appear anemic or at times edematous.

There is, as a rule, no evidence of suppuration, but there is a considerable amount of desquamation of the mucous membrane and gums and an accumulation of débris around the gum margins. The condition generally terminates upon the cessation of the catarrhal inflammation of the mucous membrane of the nasal passages and the throat. The *Micrococcus catarrhalis*, and the pneumococcus are frequently found.

Mild acid mouth washes are good, and gentle swabbing to clean the teeth and gums is indicated. This form of stomatitis is, as a rule, mild but may be, if neglected, the forerunner of a so-called pyorrhea.

Chronic gingivitis is found in the unclean mouths of middle-aged people. The gums are red and bleed easily. There is no pus in evidence, but much débris around the necks of the teeth. The condition is always very chronic and is not recognized at first. The disease generally begins with soreness around the necks of the teeth. The gums may become ulcerated in four to five days and this condition spreads to the mucous membrane of the cheeks. There occurs, at times, a yellowish slough and when this comes away, the gums are quite painful. The ulcerated surfaces are irregular and heal and again break down at intervals. There is apt to be a slight rise in temperature, and diarrhea sometimes occurs. The breath is fetid. The entire surface of the gums may be affected, but the attachment of the teeth is not impaired. The patient finds it very difficult to take solid food. The submandibular glands may be swollen.

Spirochetes are present at times, gram negative threads may be found. Sometimes a diplobacillus may be isolated.

The mouth and teeth should be thoroughly cleansed at frequent intervals. Mild mouth washes and cotton swabs should be used gently to remove the débris around the necks of the teeth. Fruit juices and light nourishing food should be given and the patient's general condition improved as much as possible. This condition is very apt to recur, especially if the hygiene of the mouth is neglected.

Hypertrophic Gingivitis. The chief characteristic of this form of stomatitis is the enlargement of the gingival flap or margins of the gums. It may be acute or chronic and it may be localized or spread to the entire gum covering of the bones. It may be confined to one or more teeth being due to local

irritation caused by crowns and bridges. In the beginning only the gum tissue is involved, but later the alveolus may also become affected. The gums often become infected during this condition and especially where the teeth are irregular.

The gums are swollen and congested and bleed easily. The attachment of the gums appears to be impaired but there is no discharge of pus, as a rule, from the gingival margins. Much débris collects around the teeth and gums, consisting of food, epithelial cells, and mucus. The *Leptothrix racemosa* of Vicentini may be found in large numbers when a culture is examined. The swollen surface of the gum may be nodular, irregular, and turgid in appearance. There is little pain. The extent of the condition generally depends upon the amount of irritation. There is a fetid odor present.

The condition generally corrects itself in children, but in the adult if not treated it may go on to infection of the alveolus and eventually loss of teeth. The teeth should be carefully scaled and kept clean. All irregularities should be corrected and all irritations around the neck of the teeth should be eliminated. Sometimes the hypertrophic tissue should be removed either with a knife or cautery. Astringent mouth washes are, at times, useful. All systemic disorders should be treated at the time the local condition is being cared for. This form of gingivitis may become chronic and then may be localized, general, circumscribed, or diffuse.

Atrophic Gingivitis. This is characterized by a gradual shrinking or wasting away of the gingival tissue. This is due chiefly to the affection of the submucosa and an atrophy of the gum as a whole. It is not, as a rule, caused by injury.

The edges of the gums are pale and irregular, the contour of the gum appears fuller and thicker and the interdental papilla is thickened as the process of shrinking progresses; the gum attachment is greatly impaired and the alveolar

process may become infected. The mucous membrane of the cheeks may be rather anemic in appearance and the mouth is, as a rule, drier than normal, due to an impairment of the mucous glands. The alveolar process appears to be thinner than normal at times, and more translucent. This condition is more common in males than in females.

It is sometimes difficult to recognize this form of stomatitis during the onset of the disease. It may be mistaken for the simple traumatic variety of stomatitis. The absence of a purulent discharge and of bleeding and congestion differentiate it from what we call pyorrhea alveolaris.

It is difficult to treat. Massage of the gums may help in giving the parts better circulation. When the cervical margins of the teeth become badly exposed and the attachment impaired, the teeth should be extracted. Great care should be given to the hygiene of the mouth.

Mycotic Gingivitis (*Thrush, White Mouth*). There are large white areas on the gums sometimes simulating those of diphtheria. These are found on the tongue, buccal mucous membranes, and the fauces. There may be a sweetish acid odor. There is no pain, as a rule, but this may develop if the mucous membrane becomes abraded when the white patches are removed. The disease occurs in young infants and children under five years of age, but it may affect adults in the terminal stages of some of the wasting diseases, notably tuberculosis. In children the onset is rapid and is often accompanied by gastroenteric disturbances.

The white layer on the gums is due to the growth of *Saccharomyces albicans*. There are found large numbers of yeast forms and mycelia. The disease is often caused by unclean feeding bottles and unhygienic conditions of the mouth in infants.

Thrush is easy to treat. A mild alkaline mouth wash applied on cotton swabs will generally effect a cure. Metabisulphite

of soda is a good specific. The mouth hygiene must be carefully attended to. This condition may be mistaken for diphtheria and mercurial stomatitis at times.

Necrotic Gingivitis (*Vincent's Angina, Ulcerative Stomatitis, Trench Mouth*). This is a gingivitis beginning in the free margins of the gums. There is an acute necrotic inflammation which spreads rapidly buccally. This is generally associated with pain, foul breath, and perhaps gastroenteric disturbances. The disease occurs often in childhood and may be a complication following diphtheria, measles, scarlet fever, scurvy, or perhaps dysentery. There have been outbreaks of the disease in many of the armies in various campaigns. It was called "trench mouth" during the world war, and affected many of the soldiers in France.

The disease spreads more rapidly in children than in adults. A sharp grayish white line of necrotic tissue appears along the gum margin. There may be a retraction of the gums from the teeth, and the gums bleed readily at the gingival margins. There is much pain at times, and it is difficult for the patients to eat or to brush their teeth. No membrane is formed, but there is, at times, considerable sloughing of tissue. There may be a temperature of 100° — 103° F., associated with gastroenteric disturbances, a dirty tongue, and a peculiar foul-smelling breath. The ulceration has a tendency to heal in one place and break down in another. It may start around one tooth and spread to others. There may be glandular involvment. Many fusiform bacilli and spirochetes are found in the ulcerating margins of the gums. The disease is closely related to noma, and in children there is always danger of an extension of the infection into the deeper tissues.

A definite diagnosis can always be made by means of a smear taken from the ulcerating surfaces. This disease may affect the tonsils, the fauces and pharynx, and the soft palate. It may start either in the gums or in the throat.

The treatment is local and general. The mouth condition can be cleaned up quite rapidly by means of Dakin's solution in spray and by Fowler's solution, powdered perborate of soda, and chromic acid, applied by means of cotton swabs. Tooth extraction and other surgical procedures are contraindicated during the active stage of this infection. Salvarsan intravenously has been used with good results. The condition is apt to recur if there are many gum pockets which cannot be kept clean, and if the teeth are very irregular. It is not exceptional to see an apparent cure of this condition in ten days to two weeks and to have it recur in one to six months and even one or two years later, especially if the patient is careless as to the hygiene of the mouth.

Noma (*Cancrum Oris*). This disease is a most rapidly spreading process of gangrene of the gums and cheeks and and invades the surrounding hard and soft tissues. Spirochetes and fusiform bacilli are found in great numbers.

It generally starts with a small ulcer on the side of the cheek. It appears first as a gray-white slough and is generally accompanied by a small ulcerative patch on the gum margins. The early picture of this condition is much like that of Vincent's angina; and the process may arise in the throat and spread to the mouth. If the gray-white slough is removed, it leaves a raw bleeding surface that is very painful. There may be multiple ulcers, but one side generally becomes hard and swells and goes on to necrosis and perforation. The lips and face may be greatly swollen also, and at the same time the temperature rises to 101°–103°F., with a very rapid pulse. As the ulceration spreads, large portions of the cheek and perhaps portions of the bone are exfoliated, off, leaving a deep-seated ulcer. Severe swelling of the glands follows and the patient usually dies from exhaustion and toxemia.

The disease generally occurs in young children who have become greatly debilitated by infectious fevers or are suffering

from malnutrition. There does not appear to be sufficient evidence to prove that this disease is contagious, but the child should be isolated from others.

The prognosis in children is very bad; the death rate being high. It is most important to try to check the ulcerative process as soon as possible. Swabbing with dilute chromic acid and the internal administration of potassium chlorate are called for, and also iron is indicated. The intravenous injection of salvarsan seems to be of great benefit in certain cases. It is good practice to build up the patient as much as possible by a generous diet, the administration of cod-liver oil, etc. Good oral hygiene is absolutely demanded.

Alveolar Abscess. Dental caries, or the decay of teeth, affects members of the civilized races more than savages. The teeth are destroyed by bacterial action upon fermentable food particles that become attached to the teeth. Organic acids, principally lactic, are produced after carbohydrate fermentation has taken place. The lactic acid thus formed attacks the lime-salt constituent of the tooth, which in the enamel is about 90 per cent of the entire substance. When the decay reaches the dentine of the tooth, the process travels faster, as the dentine contains more organic matter in its matrix and is more soluble in organic acids. The dentine is gradually destroyed and bacterial products filter through the canals in the dentine to the pulp chamber or to the nerve of the tooth. Here it may reach the blood stream. The pulp now becomes inflamed and undergoes suppuration, gases are formed, and, if the tooth is filled, the infection travels in the only direction it can, namely to the open end of the tooth, out through the apical foramen. Thus a dento-alveolar abscess is formed after the tooth and the contiguous tissues are infected. This pathological state, when chronic, has been called a "gum boil" by the medical profession and laity in the past, but this term is now obsolete.

A true alveolar abscess may be acute or chronic and invariably arises from a non-vital tooth. The cause is generally a carious tooth but in some cases the pulp of a tooth that has no cavity may become devitalized by trauma or shock, caused by extreme hot or cold food or drink or constant irritation from a deep-seated filling. Organisms may enter the pulp chamber from within the tooth or from without, and death of the pulp follows. Bacteria and their products escape through the apex of the tooth to the peridental membrane, where an inflammatory reaction takes place in the alveolus, the bone becoming involved. The alveolar plate may now be perforated and the abscess become subperiosteal. If the process continues the abscess may strip up the periosteum covering the bone and may furrow for some distance or break through the gum near the seat of the primary cause of the trouble, namely the infected tooth. The acuteness of this condition depends greatly upon the virulence of the organisms present and the resistance of the patient.

The number of instances where the pulp becomes infected through systemic blood infection are few. The lateral communications of the pulp through the walls of the root to the peridental membrane, as shown by Black and Howe, make it extremely difficult ever really to sterilize a root canal after it has become infected. Probably all non-vital teeth are, or become, infected and perhaps the most important question now before the dental profession to decide is whether or not non-vital teeth should be retained or removed. A chronic alveolar abscess generally starts from an infected pulp, but it may arise from a peridental suppuration that enters the alveolus of a vital tooth. In this case the pulp of the tooth in the affected alveolus becomes devitalized quite early.

All the symptoms of inflammation are present in the acute stage of an alveolar abscess. The impaired function of the

tooth is generally brought to the attention of the patient in no pleasant manner when he unwittingly bites on the tender tooth. The inflamed and swollen peridental membrane causes the tooth to project somewhat from the alveolus, and the tooth is very painful on percussion. The radiograph may show an infected area around the apex if the process has continued long enough to have caused a change in the structure of the bone.

The acute symptoms of the above may pass after the abscess has pointed and discharged through a sinus, thus relieving the pressure on the tissues. The sinus may, after a while, close up and disappear, leaving only a little scar or a thin watery discharge which may persist for months or years. The sinus generally leads to the apex of the infected tooth.

The bacteria found in a chronic alveolar abscess of apical origin are generally the *Streptococcus viridans;* a culture can best be obtained by the careful extraction of the infected tooth without allowing it to touch any of the tissues of the mouth or to become contaminated by saliva. Henrici and Hartzell have obtained cultures by trephining the alveolar process. This is a difficult procedure and one that is not satisfactory in most cases. Acute alveolar abscesses, or those resulting from periodontal infections may show cultures containing *Staphylococcus aureus* and other bacteria.

It is quite easy, as a rule, to recognize an acute alveolar abscess. There is generally present swelling with thickening of the tissues, the tooth is tender on percussion, and there is generally considerable pain on the affected side of the mandible or maxillary bone. It is much more difficult to diagnose a chronic alveolar abscess, especially when the abscess has not pointed and is still deeply buried within the bone. Radiographic examination in the chronic cases is of great assistance as is also the vitality test of the teeth in the region of the supposed infection. It is important to know

at an early period whether the teeth are vital or non-vital, as most alveolar abscesses are caused by non-vital teeth. In chronic cases the pain is felt mostly at night when the patient is in the recumbent position. A slight rise in temperature may occur in either the acute or chronic stage and quite often the patients may have chilly sensations and be generally uncomfortable. They cannot eat with any comfort and their sleep is seldom uninterrupted. An alveolar abscess may infect the maxillary sinus and may also cause a rarefying osteitis of the maxilla or mandible, which is often difficult to eliminate. Actinomycosis, mercurial stomatitis, phosphorus necrosis, specific lesions, and neoplasms may at times complicate the diagnosis of an alveolar abscess. Therefore any swelling, in about any part of the jaw bones, must be approached with great caution.

Neglected or improperly treated alveolar abscesses may cause the patient a great deal of discomfort and, at times, permanent deformity. For instance, an abscess may drain through the tissues to the face or under the lower border of the mandible to the neck, causing unsightly scars. An abscess in the region of the angle of the jaw may cause a very persistent trismus by infiltration into the masseter muscle. This condition may simulate tetanus. Infection into the blood stream is rare, but does occur and with fatal results at times. Acute edema and swelling of the tissues sometimes take place in connection with an alveolar abscess which may then be difficult to differentiate from Ludwig's angina. Abscesses of the upper jaw, may drain into the palate and strip up the periosteum even to the attachment of the hard and soft palate. Tonsillitis, pharyngitis, and other diseases of the nasopharynx may result from prolonged dento-alveolar abscesses.

Treatment. An acute abscess generally needs immediate surgical attention. It is good practice to extract an infected

non-vital tooth that is thought to be the cause, and so secure immediate drainage. The old saying "wait till the swelling goes down before extraction" is, at times, dangerous advice. If the abscess arises from a suppurative periodontal disease the question of extraction is not of immediate importance as drainage may be obtained by opening the pockets around the teeth and by incision and drainage of the abscess itself. A careful radiographic examination should be made, if possible, before any treatment is instituted so that the operator may know the exact condition of the teeth and bone, and thus be enabled to render intelligent and scientific treatment at the beginning of the trouble. In chronic cases, the infected teeth should be removed gradually, this depending upon the patient's general condition and the local findings. If the abscess is draining freely, there is no special reason for immediate extraction, and discretion should be exercised not to remove too many infected teeth at one time. The possibility of thereby producing a delayed but increased infection of the tissues that are of a low vitality must be considered. It is, at times, good practice to use an appropriate vaccine to raise the patient's general resistance before the removal of too many infected teeth is undertaken. The patient should be given a light nutritious diet and the bowels should be moved regularly. The patient should be put at rest and the mouth be kept as clean as possible.

NEW GROWTHS

Most neoplasms, including cysts, which occur in other parts of the body (except those that are associated with certain special organs) may be found in the mouth. There are also certain tumors and cysts that are peculiar to the buccal cavity.

Hypertrophy of the gums and tumor-like masses, though not really new growths, are quite common in the mouth. In

this condition we find that there is an overgrowth of gum tissue, generally commencing at the gingival margins. Localized hypertrophy of the gums is generally due to a mild irritation caused by some ill-fitting dental appliance and a chronic infection. A person who has chronic suppuration of the gums and who is wearing a poor fitting crown that presses upon the gums, is apt to have an overgrowth of gum tissue around the neck of the tooth upon which the crown is attached.

Generalized hypertrophy of the gums occurs chiefly in mouths that are badly neglected and where calcareous deposits are present around the necks of the teeth and where the gums have become abraded and are infected and at times suppurative. The gums are greatly swollen, red, and bleed so easily that the patient does not dare to use a tooth brush. These mouths are consequently most unclean and the breath is very foul. It is difficult for one to eat with this condition, as the teeth are often loosened and there is a great deal of toxic absorption taking place from the mouth that may cause a general weakened condition of the patient.

In these cases it is good practice to remove the loose teeth and to clean up the mouth in general and in many cases to excise carefully, the hypertrophied tissue.

Epulis. The most common and the simplest form of tumor in the mouth is the so-called epulis. It is a circumscribed growth attached to the periosteum of the alveolar process, and is either pedunculated or has a broad sessile base. These little tumors are reddish in appearance and bleed easily and may become ulcerated. They are connective-tissue tumors and may be classed as fibromas or giant cell sarcomas. They are generally benign, but should nevertheless be thoroughly excised, care being taken to remove carefully the attachment to the bone and any teeth involved in the growth. It is good practice, as a rule, to cauterize the bone underlying such a growth or to remove the bone to which

it was attached. It is most important that all such innocent appearing growths, when excised, should be carefully examined microscopically to ascertain their true character.

Fibroma. Besides the pedunculated fibroma, which is generally regarded as an epulis, fibromata may develop either from the periosteum or from fibrous tissue contained within the bone. Trauma seems to play a part in the history of these growths, and they grow very slowly. The diagnosis can generally be made on their slow growth, their distinct nodular outline, and their firm consistency. The growth should be thoroughly excised, a layer of the bone to which it is attached being taken with it.

Osteomata are tumors composed of bone surrounded by a layer of cartilage. They are found more frequently in the superior maxilla than in the mandible, but may attack any of the bones of the face. They may consist of compact or cancellous bone and grow slowly, but attain large dimensions if not operated upon. They generally have a broad base, but may be pendunculated. Usually they are painless, but may cause pain by pressure. They are benign in character and do not recur when thoroughly removed.

Sarcoma. In considering sarcoma of the jaws, we find that we have the spindle, large and small round cell, and a mixed type of tumor composed of cells of a different character. The histological examination will often tell the kind of tumor with which one is dealing. The large round-cell and the spindle types of tumor are less malignant than the small round-cell variety. The degree of malignancy of a sarcoma depends a great deal upon the amount of fibrous tissue present. The most malignant of all are the melanotic sarcomata.

The tumors arising from the periosteum are generally firm in consistency while those arising from within the bone are much softer. In the maxilla periosteal sarcomas may involve the maxillary sinus, producing a thinning and bulg-

ing of its walls, followed later by a perforation and an involvement of the soft tissues. Sarcoma generally causes pain in the more advanced stages by pressure.

The diagnosis must be made by a careful microscopic examination. The treatment consists in a radical removal of the growth *en masse*, and a good part of the surrounding healthy tissue. Radium may also be used. Metastasis from sarcoma of the jaws is less frequent than from this type of tumor elsewhere in the body.

Carcinoma of the mouth and jaws is generally found in elderly people. It springs from the epithelium and generally from the mucous membrane covering the gums or tongue. These growths are often associated with some form of mouth irritation. Leucoplakia and smoking play an important role in the causation of this neoplasm. It is much more common in men than in women. We may mention two clinical types, the hard ulcerating type, seen in the mandible and tongue, and the softer kind found in the antrum and mucous membrane of the upper jaw. The involvement of the lymph glands takes place earlier when the carcinoma occurs in the lower jaw or tongue than when the growth is present in the upper jaw.

In the mouth we generally find microscopically, the squamous prickle-cell variety. The malignancy of cancer appears to be different in the various localities. The primary site of this dreaded new growth of the mouth may be the lower lip, the tongue, buccal mucous membrane of the upper and lower jaw, floor of the mouth and palate. From these parts it may spread to neighboring tissues.

Leucoplakia is characterized by one or more white patches on the mucous membrane. The tissue containing the patches feels hard upon palpation. These patches may appear first at the angle of the mouth, along the border of the tongue and the sides of the upper and lower molars. A definite history of excessive smoking is generally given by the patient,

and many of these patients have a positive Wassermann reaction. At times, the patches show a tendency to crack or peel off and this is generally an early sign of the beginning of cancer. We find under the microscope a thickening of the outer layers of the squamous epithelium. It is well to excise the white patches thoroughly, and have them examined. The patient must keep the mouth clean with mild brushing and use non-irritating mouth washes. He must give up the use of tobacco.

Dentists, as a rule, have an opportunity of seeing patients suffering from early leucoplakia and incipient cancer, in their regular routine care of the mouth, in advance of the medical practitioner. It is their duty to warn the patient of any little irregularity of the mucous membrane of the mouth, tongue, or lips and to see to it that the patient does not delay in securing intelligent treatment of anything that appears suspicious.

The mouth is probably the most unclean cavity in the body, and the tissues forming its structure are traumatized greatly by extremes in temperature in the form of hot or cold foods, injuries from biting hard substances, and poor dentistry, such as ill fitting plates, crowns and bridges, etc. It is often difficult for a person, over forty to forty-five years of age to keep the mouth really clean. Mouth hygiene is, as yet, not practised as it should be. In middle and advanced age the gums are apt to recede, pockets form, the teeth become loosened, and the upkeep of the masticatory apparatus is more difficult. Decomposing food particles allowed to lodge in the pockets between the teeth, add innumerable bacteria to the field. Bacteria plus traumatism often mean infection and thus the oral cavity is frequently the seat of disease. The pathology of the mouth is being studied daily, but doubtless the future will bring much new knowledge which will have a direct bearing on the general health of the individual.

CHAPTER XVI

DERMATOLOGY

GEORGE M. MACKEE, M.D.

WITH the exception of cancer, syphilis, fungus diseases, pyogenic affections, dermatitis venenata, and a few other cutaneous conditions, preventive medicine in the field of dermatology has not received the attention that it deserves.

Dermatologists realize the importance of prophylactic measures, but progress has been slow because the etiology of most skin diseases is unknown or doubtful. Clinical and laboratory research in dermatology has developed facts and impressions that have been used advantageously in preventive medicine, but there has been no concerted action, no educational campaign. What is required, apparently, is more laboratory research, greater emphasis on preventive medicine in undergraduate and postgraduate dermatological instruction, and educational propaganda for both the medical and lay publics.

Unless carefully done, however, an attempt to educate the laity may result in more harm than good. The question that must be decided is not what is best for the medical profession but what is best for non-medical persons. Conferences between selected representatives of various vocations and avocations might lead to an unbiased answer to this question.

The altruism of practising physicians who publish medical articles in the lay press is bound to be questioned. The articles are likely to contain more beliefs and impressions than facts. The lay reader can not separate the good from the bad and, in most instances, this is also true for the editor of the publication in which the article is published. There

will be contradictions, unreliable, misleading, and even untruthful information. There is an increasing tendency for physicians to write independent articles for the lay press and to give unsupervised talks over the radio. This may eventually result in keen advertising competition which, in turn, may prove detrimental to both the medical profession and the non-medical public. It would seem safer and wiser to have such articles signed by some city, county, state, or national organization, whose altruism is beyond dispute, rather than by the person or persons who write them.

This chapter, which is for the practitioner of general medicine, is not a scholarly dissertation with review of the literature. It is intended to be a practical and reasonably comprehensive presentation of preventive medicine as applied to dermatology based on what the writer believes to be the consensus of dermatological opinion.

The portion of the chapter that deals with the so-called precancerous dermatoses was the basis of an address given before the Section on Dermatology of the Pennsylvania Medical Society at the Pittsburgh Session, October 20, 1927.[1]

PRECANCEROUS DERMATOSES

Incidence and Mortality of Cutaneous Cancer. As every physician knows, cancer mortality is very high, but it has been reduced considerably by an educational campaign aimed at both the lay and medical publics. In addition to periodic medical examinations, persons have been urged to consult their family medical advisers, or a clinic, at the first evidence of illness. Attempts have been made in various ways to familiarize students and practitioners of medicine with the very early indications of cancer, and with modern methods of treatment. Until more satisfactory treatment is discovered,

[1] Published in part in *Atlantic M. J.*, March, 1928.

the best way to reduce cancer mortality further is to recognize and completely destroy the disease before metastasis occurs. Because metastasis may occur very early, it is desirable that diagnosis be made and adequate treatment given as soon as possible.

Most cutaneous cancers develop on an antecedent lesion or defect. These potentially dangerous conditions are well known to dermatologists and will be discussed later. The point to be emphasized here is that recognition and proper treatment of precancerous lesions will substantially reduce the incidence of this dreaded disease. Obviously, it is difficult and often impossible to detect such lesions of the viscera; but those of the skin and orificial mucosa can be easily recognized and most of them can be successfully treated. It should, therefore, be the duty of every physician to become diagnostically and therapeutically acquainted with the precancerous dermatoses, and to encourage periodic physical examinations at which time the entire body surface and the orifices should be carefully inspected.

The conditions of the skin and contiguous mucous membranes in which cancer is prone to develop are numerous. The potentially dangerous members of this group that fall within the category of dermatology, commonly termed precancerous dermatoses, will now be enumerated and briefly discussed.

Leucoplakia. It is the consensus of opinion that leucoplakia of the mouth may occur in both syphilitic and non-syphilitic persons. Its etiology has not been definitely determined. Presumably it can be caused by syphilis and by local irritation, but as a rule antisyphilitic treatment has little if any effect on leucoplakia. When occurring in syphilitic persons it is often associated with interstitial glossitis and smooth atrophy, a triad that is probably more dangerous than uncomplicated leucoplakia.

Leucoplakia may occur in one or several very small patches on the tongue, lips, or mucous surfaces of the cheeks, or most of the buccal membrane may be involved. Small patches on the gums, under the tongue, on the roof of the mouth, behind the molars, etc., may escape careless examination.

The patches are white, usually marginated, irregular in size and shape, slightly thickened, and a trifle rough. The patient is often conscious of the affection although subjective symptoms are not conspicuous as a rule. The affected area may develop fissures, erosions, or it may become verrucous or vegetating. Such lesions are especially dangerous, but it should be borne in mind that malignant epithelioma may develop suddenly and rapidly in an apparently inactive patch of leucoplakia.

The affection must be differentiated from lichen planus, lupus erythematosus, mucous patches, apthous ulcers, and Vincent's angina. The mouth lesions of lichen planus are punctate, striated, papular, and usually accompanied by skin lesions. Lupus erythematosus rarely involves only the mucosa. The lesions are more inflammatory—congestion, edema, and erosions. The other three diseases may be differentiated by acute symptoms, concomitants, and bacteriological examinations.

Treatment. It is customary to destroy small patches of leucoplakia with electrodesiccation or with the electric cautery. Many such lesions may be permanently cured with a single, intense application of the beta rays of radium. If, however, the lesion is stubborn, it is preferable to resort to the previously mentioned treatment rather than give repeated applications of radium.

Large quiescent areas may be treated palliatively. Dental hygiene must be perfect. Smoking is prohibited. Active areas should be destroyed. Treatment that is incapable of

completely destroying the lesion should be avoided. If the patient has syphilis, modern antisyphilitic treatment is indicated; but not with the idea of curing leucoplakia. In fact there is reason for believing that the persistent use of arsenic in cases of leucoplakia and interstitial glossitis may encourage the development of cancer of the tongue or mucous surface of the cheeks.

The mouth of patients with leucoplakia should be inspected every few months.

Miscellaneous Mouth Lesions. Chronic gingivitis, pyorrhea alveolaris, apical abscess, sinuses, fistulas, erosions, ulcers, decayed teeth, etc., favor the development of cancer. Betel-nut chewing (among East Indians), and holding hot pipe stems in the mouth have been known to cause cancer of the lips and mouth (glass-blowers' cancer).

The dental profession deserves a great deal of credit, not only for superb mechanical ability, but because of the recognition that perfect oral hygiene is an exceedingly important health factor. The modern dentist urges his patients to have the teeth cleaned by a prophylactic dental nurse at least twice yearly at which time the dentist inspects the entire mouth. Undergraduate and postgraduate instruction in diseases of the oral mucosa is given in many dental schools and dental societies. This knowledge together with periodic dental examinations should materially lessen cancer incidence. The dentist has the opportunity to detect many of the conditions that lead to cancer. Some of these must be treated by the dentist; others should be called to the attention of the family medical adviser.

Kraurosis Vulvae. In general, what has been stated relative to leucoplakia pertains to kraurosis vulvae. As a rule it is well to leave this disease alone and keep the patient under observation, but areas of visible activity should be radically destroyed. Good local hygiene is indicated. Itching

may be relieved with non-irritating topical antipruritics such as lotions and ointments containing small quantities of menthol, methyl salicylate, butesin, anesthesin, phenol, etc. Scratching and rubbing are interdicted. Roentgen rays may be used as an antipruritic if necessary, but such treatment should be limited to one or two short courses of fractional doses.

Seborrheic or Senile Warts. These lesions, which have a predilection for the face, hands, back, and chest, are of various clinical types. They often begin as split-pea to dime-sized, brown or yellowish-brown macules ("senile freckles"). After months or years the horny layer becomes thickened. The resulting scale or crust may be dry and firmly adherent, or comparatively soft, greasy, and easily removed. The color may be gray, yellowish-brown, or brownish-black. Exfoliation may be spontaneous; if so, the keratosis almost invariably returns.[6] Keratoses of these types develop very frequently, perhaps most frequently, without preceding pigmentation. Also, most "senile freckles" do not become keratotic.

The first visible evidence of a keratosis may be a pinhead-sized, flat papule, a little darker than the normal skin. This type is most common on the backs of the hands.

After keratoses are well developed they can be divided, as a rule, into three general groups—keratoid, nevoid, and verrucose. The lesions thus far described may be regarded as of keratoid type, the chief clinical characteristics of which are: Pinhead, split-pea, or dime in size. At first there is very little thickness or elevation; later, they are likely to become distinctly elevated. The horny layer may be dry, hard, and adherent, or soft and plastic. Many gradations exist between these two extremes. The color varies from light gray to very dark brown.

Lesions of nevoid type are seen most frequently on the back and chest. They range in size from a split pea to a

fifty-cent piece; they are soft, considerably elevated, yellow or brown in color, and there is very little hyperplasia of the horny layer.

The verrucose type is characterized by elevation and a thin, yellow scale or crust which, when removed, reveals a warty surface. At times a lesion is distinctly verrucous before the horny layer is removed. Such lesions may resemble common warts (verruca vulgaris).

Cutaneous horns may be grouped among the senile keratoses. They are encountered most frequently on the face, and vary in size from a tiny lesion suggestive of a filiform wart, to lesions that project an inch or more from the surface. Epithelioma develops at the base of the lesion.

Chondrodermatitis nodularis chronica helicis (painful nodular growths of the ear) bears resemblance to keratosis of the rim of the ear and, for convenience, may be included in this group.

As a rule the evolution of a keratosis is very slow. At least many months and often many years are required for maximum development. They seldom undergo spontaneous involution. Occasionally they are encountered in young adults; they are common in middle life, and most common in elderly persons.

The majority of keratoses of the skin never undergo malignant change. Of those that do become epithelioma, the majority are of the basal cell type. Many of the squamous cell epitheliomas that develop on a keratosis are of slow growth; some, however, are of rapid evolution. Epitheliomas that develop on keratoses of the labial mucosa are practically always of the squamous cell variety. Repeated irritation and inadequate treatment of a keratosis appear to encourage malignant change.

Treatment. Whether or not a given seborrheic or senile keratosis should be treated depends on conditions. If the

patient is old, especially if the lesions are numerous, and there is no objection to cosmetic appearance, treatment is unnecessary provided that there is no evidence of epithelioma, and the patient can be inspected at least once yearly. The type and location of the lesion must be considered. The dry type is perhaps more dangerous than the waxy type. Keratoses of the lips are especially dangerous and should be destroyed. In general, it is a good plan to destroy every well-developed keratosis.

"Senile freckles" are mostly of cosmetic importance and as it is difficult, often impossible, to remove them without leaving depigmentation, it is customary to ignore them unless they are keratotic.

Very superficial keratoses of the skin can be cured with a single application of a concentrated solution of trichloracetic acid after removal of the hyperplastic horny layer. If the lesion is thick and elevated, it is customary to curette thoroughly before applying the acid. Refrigeration (solid carbon dioxide) is a satisfactory method of treatment for superficial lesions. The electric cautery and electrodesiccation are excellent modalities. Roentgen rays and radium, especially the beta rays, are efficacious in many cases. Such treatment is especially valuable when it is desirable to avoid scarring and depigmentation. If there is any possibility of epithelioma as manifested by infiltration, nodulation, and ulceration, the lesion should be radically destroyed. This may be accomplished by excision, surgical diathermy, roentgen rays, or radium. When dealing with keratosis of the labial mucosa, even when the lesions are very small and superficial, radical destruction is essential. Patients who have a tendency to develop labial keratoses should avoid smoking, biting and wetting the lips, and strong sun light and, in addition, it is a good plan to counteract excessive dryness with frequent applications of grease.

Miscellaneous Keratoses and Warts. Arsenic causes keratoderma with predilection for the palms and soles. Occasionally the affection is more or less generalized. It is often accompanied by widespread, punctate pigmentation. The characteristic picture is excessive dryness of palms and soles with almost innumerable punctate, deep-seated keratoses. Occasionally, very large, thick lesions are encountered. The arsenical keratosis is the forerunner of both basal cell and squamous cell epithelioma. The affection is treated with copious applications of grease. Active lesions are destroyed by methods already mentioned. The further administration of arsenic is to be avoided. In recent years it has been customary to administer sodium thiosulphate.

From the standpoint of preventive medicine arsenic is a very much abused drug. It is unwise to give arsenic in any form over a long period of time without intervals of rest; in other words, accumulation should be avoided. In addition to pigmentation, keratoses, and cancer, arsenic causes zoster, jaundice, dermatitis exfoliativa, and injuries to the nervous system, viscera, etc. Recently the drug has been said to cause scleroderma, eczema, and other dermatoses, but such observations have not been confirmed.

Industrial Keratoderma. Workers in crude petroleum, paraffin, tar, and other industrial products, occasionally develop follicular keratoderma, particularly of the hands and forearms. Many cases of cancer developing on dermatoses of this type have been recorded. Years ago chimney sweeps exhibited cancer of the scrotum and crural region secondary to dermatitis caused by the irritating effect of carbon that was allowed to collect and remain on the skin. Even gardeners who use soot in their work, have been known to develop cancer. Persons who handle these products should be protected by proper hygiene and, if necessary, should change their occupation.

Industrial cancer is found in numerous occupations among those who handle arsenical products, radium, etc., Many of these causes are discussed in different sections of this chapter.

Verruca, Clavus, etc. Corns, callus, and the various types of benign warts of the skin are considered to be free of danger if not subjected to repeated traumatism or constant irritation. The common wart and ordinary callus appear to be entirely benign, but corns, and papillomas of the bearded region and scalp have been known to develop into malignant epithelioma. Any wart that is likely to be repeatedly irritated, should be destroyed with refrigeration, electrodesiccation, or other method. Papillomas of the mucous membranes are more dangerous than are those of the skin.

There is at least one recorded instance of cancer developing in a case of keratosis follicularis (Darier's disease).

Radiodermatitis. This term includes cutaneous injuries effected by both roentgen rays and radium. From the standpoint of cancer, the immediate result of acute reactions may be disregarded. Chronic radiodermatitis consists of any one or a combination of the following features: telangiectasia, atrophy, sclerosis, keratosis, ulceration, pigmentation, and depigmentation. It may develop insidiously or follow an acute reaction. This so-called roentgen ray or radium skin is dangerous. Chronic ulcers and keratoses frequently change to malignant cancer.

It is often possible to destroy the keratoses with beta rays. Electrodesiccation is an excellent modality for the purpose. A large number of methods have been advocated for the management of chronic ulcers: infra-red radiation, ultra-violet radiation, dyes such as gentian violet, serum, electrodesiccation, chemicals, etc. When it can be accomplished, the best procedure is to excise the affected area, or remove it by dissection followed by skin grafting or a plastic

flap. Any other method leaves tissue that is a menace and that must be kept under observation. Even acute radiodermatitis, when possible, should be treated in the same manner as soon as the extent of serious injury has been determined. Usually it is necessary to delay surgical intervention for a month or two. The institution of surgical methods at this time saves the patient weeks, months, and even years of agony. The pain ceases almost immediately if the operation is properly performed. The final result is far better cosmetically or esthetically than when the injury heals spontaneously or as a result of other therapeutic methods. But of more importance is the fact that healthy tissue is substituted for a scar or unhealthy tissue (roentgen-ray skin) that will always be a menace.

In the vast majority of instances roentgen ray and radium injuries can be avoided by proper technic, adequate knowledge, and good judgment.

Xeroderma Pigmentosum. This rather rare affection is thought to be due to congenital lack of resistance to sunlight. It begins early in life, there is a predilection for the exposed parts, and it is incurable. The symptoms are roughly those of chronic radiodermatitis. Pigmentation and atrophy are first noted. This is followed by keratoses and by epithelioma, usually of the basal cell type.

The most that can be done for these unfortunate children is to delay the inevitable result. The patient must be protected from even indirect sun light. Keratoses and epitheliomas should be radically destroyed as soon as detected.

Farmer's Skin or Sailor's Skin. The manifestations of this condition are somewhat similar to xeroderma pigmentosum and chronic radiodermatitis. It occurs on the exposed parts of middle-aged and elderly persons who have been exposed to the sun for many years, especially in an arid climate, and who have a low actinic toleration. The skin

becomes wrinkled, dry, pigmented, and perhaps telangiectatic. Keratoses develop and cancer, usually of the basal cell variety, is common.

Treatment consists of protection against sunlight, unguents at night, and destruction of keratoses.

Nevi. Of the many forms of birthmarks, the most dangerous is the flat, blue-black mole. Many of the melanomas have their origin in lesions of this type. While malignant degeneration may be spontaneous, it is much more likely to follow traumatism, chronic irritation, or applications of caustics. If such a lesion is inactive and in a location where it will not be irritated, it may be left untreated. But if there is the slightest sign of activity such as increase in size or thickness, ulceration, crusting, etc. (Hutchinson's malignant lentigo), or if there is a possibility of repeated injury, the lesion should be radically destroyed. Malignant lentigo should be removed by a wide, deep excision, surgical diathermy, or intensive radium treatment. Selection of treatment for individual cases is necessary. The point to be emphasized is that if treatment is attempted it must be radical.

The very common mole, pinhead to split-pea sized, elevated, smooth, more or less pigmented, with or without hairs, is not considered dangerous if not subject to repeated irritation. Large brown nevi, flat or elevated, with or without hair, in the absence of repeated traumatism are not very dangerous lesions. Cerebelliform and other soft nevi are dangerous, as a rule, only when irritated. The same statement may be repeated for verrucous nevi. Cancer rarely develops on vascular nevi and lymphangioma.

Nevi are exceedingly common. Almost every person has at least one mole of some type. It is by no means necessary or advisable to destroy all moles, but their inspection should be a part of periodic health examinations. Whether

or not a nevus should be treated depends upon type, location, condition, and the judgment of the physician. In selecting treatment for a given lesion, it is well to choose a method that is universally recognized as safe and proper. Many deaths have been caused by the incomplete destruction or the irritation of dangerous types of nevi with acids and other inadequate methods.

Cicatrix. Scars are a frequent site of both carcinoma and sarcoma. Large scars resulting from third-degree burns are the most dangerous. Scars subsequent to severe injuries, operations, and destructive diseases are also a menace Small, superficial scars, cicatrices following primary union, and keloids practically never give rise to cancer. Cancer in scar tissue usually begins as an ulcer, a warty nodule, or a vegetating tumor.

Because of the dense fibrous tissue, cancer is usually of comparatively slow growth when it develops in a cicatrix. Treatment, however, should be instituted early and it should be radical, because the lesion becomes rapidly invasive as soon as normal tissue is reached. Metastasis, of course, may occur at any time. Cancer occurring in scars, especially in scars from burns, used to be called Marjolin's ulcer.

Lupus. Squamous-cell epithelioma not infrequently develops in scar or sclerotic tissue left by either lupus vulgaris or lupus erythematosus, irrespective of previous treatment. The epithelioma may begin as an ulcer or as a nodule.

Syphilis. Cancer in true gumma is rare. It occasionally develops in scars resulting from destructive syphilitic lesions. It is common, of course, in leucoplakia and also in interstitial glossitis which is usually associated with leucoplakia and smooth atrophy.

Paget's Disease. There is a difference of opinion as to whether Paget's disease is cancer or precancer. The weight

of evidence, however, points to cancer from the very beginning. In other words, Paget's disease of the breast is either secondary to or simultaneous with mammary carcinoma, and requires amputation of the breast and removal of the neighboring lymphatic glands. The disease must be differentiated from eczema of the nipple, which at times is difficult, especially in middle-aged women. Extramammary Paget's disease is said to accompany cancer of the subcutaneous tissue or of an adjacent organ. In some instances satisfactory results have been obtained with *x*-rays and radium.

Chronic Ulcers and Sinuses. Chronic leg ulcers, varicose ulcers, bed sores, fissures, fistulas, and sinuses may become cancerous, but fortunately this seldom occurs. Lesions of this type when occurring in the orifices are more dangerous than those of the skin.

Bowen's Precancerous Dermatosis. This affection is somewhat similar to the fairly common, very superficial, flat type, basal cell epithelioma (multiple epitheliomatosis cutis). The lesion begins as a dull-red, scaly patch which spreads by peripheral extension. It later becomes edematous, exudative, crusted, papular, nodular, and ulcerative. Not infrequently the lesions are multiple. It must be differentiated from extramammary Paget's disease. The lesions should be excised or destroyed with the cautery, electrodesiccation, roentgen-rays or radium.

Miscellaneous Conditions. Cancer is reported to have developed upon inflammatory dermatoses such as eczema, psoriasis, and lichen planus. But before such reports can be accepted the possibility of radiodermatitis, erroneous interpretation, or coincidence must be excluded.

Wens, and the various forms of fibroma, especially when irritated, occasionally result in cancer. Endothelioma, syringoma, benign cystic epithelioma, and paraffinoma

rarely cause cancer. Chronic friction from orthopedic apparatus, etc., may cause lesions that are dangerous. Acanthosis nigricans in adults indicates cancer of the viscera.

SYPHILIS

No one will deny that the human race would be the better for less syphilis, therefore any real effort to reduce the incidence and the results of this disease should be acclaimed. During the past seventy-five years all sorts of steps have been taken to reduce its frequency. Municipal control of prostitution, laws aimed at promiscuous sexual intercourse, registration and isolation of syphilitics, lay education, alcoholic prohibition, compulsory sanitation and education in sanitation, and many other methods have been tried. Collectively these measures have accomplished good, but on the whole the result has been disappointing. Possibly this lack of success is due to the impossibility of completely regulating, legally or morally, the misdirection of one of the most intense and most important of man's instincts.

The advocates of lay education have been exceedingly enthusiastic. When properly conducted, in the home and forensically, this method should be and possibly has been helpful. Nevertheless, syphilis is very common in large urban centers in every civilized country. Ignorance, knowledge, sophistication, religion, principle, habits, temperament, wealth, health, alcohol, opportunity, age, etc., are important factors, and these, with the exception of opportunity, seem to vary more in different parts of the civilized world than does the incidence of syphilis. The fact that a fairly large number of medical students and physicians contract the disease in the conventional manner makes one hesitate to ascribe too much importance to "education." In any event the problem is exceedingly complex and it is doubtful if the incidence of the disease can be substantially reduced except

by early diagnosis and proper treatment. It is believed, but not proved, that syphilis can be prevented by rubbing into the inoculated area for five minutes, an ointment composed of one-third calomel and two-thirds lanoline, provided that this is done within eight hours. Possibly something may be accomplished by thoroughly washing the exposed part and using the ointment immediately after exposure. It is a good idea, also, to urinate and then syringe the urethra with a ten per cent solution of argyrol.

Many if not most students of the disease are now of the opinion that the best way to reduce the number of cases of syphilis is to make the diagnosis by demonstrating the *Treponema pallidum* in the early stages of the initial lesion, and then immediately to institute adequate treatment. It is possible really to cure syphilis in this early stage, although several months or a year or two may be required for the purpose. Proper treatment, applied at this early stage, and continued for a sufficient time, will prevent the development of contagious lesions, so that the patient is not a menace to others. Also, the chancre quickly disappears. It is important, of course, to warn the patient that he must protect others until he is no longer contagious, and those whom he might have infected before the diagnosis was established, should be examined.

Physicians should be acquainted with typical and atypical chancres on various parts of the body and they should be constantly watching for such lesions, especially in the vagina, urethra, anus, mouth, etc. A suspicious lesion should be examined bacteriologically at once. As a rule the *Treponema pallidum* is easily demonstrated by means of the dark-field microscope. If the first examination is negative, it is a good plan to apply a wet dressing of boracic acid for twenty-four hours and make another attempt. It is necessary to differentiate between the treponema and other

spiral organisms such as *Spirochæta refringens*, *S. macrodentium*, *S. microdentium*, etc. This can be done morphologically, and by obtaining exudate from a depth. Most of the organisms that must be differentiated are found on the surface while the treponema is obtained from the tissue. For this reason it is customary to cleanse the lesion with sterile water and irritate the tissue until serum containing red cells is obtained. If the chancre is undergoing involution it may be impossible to demonstrate the causative organisms. In such instances they may be found in the regional lymphatic glands; if not, one must depend on other diagnostic evidence such as a positive Wassermann reaction, macular exanthem, etc.

The therapy of syphilis, even of very early syphilis, is not within the scope of this communication. Suffice it to state that a patient in the very early stage of syphilis should receive several courses of combined treatment—arsphenamine and mercury or bismuth over a period of two years. It is customary to make the first course very intensive.

There is reason to believe that substantial headway is being made in the campaign against syphilis. The incidence appears to be on the decline, the symptoms are less severe, and late manifestations such as tabes, paresis, aneurism, etc., seem to be less common. No single endeavor can be given credit for this change. If syphilis is really less frequent and less damaging, the improvement is due, probably, to a number of causes, but the scientific and intelligent management of the disease during the past two decades has been undoubtedly a very important factor.

Education of the public in matters relating to syphilis is important, but in spite of the best efforts in this direction it will be a very long time before the public will regard syphilis as anything but a loathsome, secret, incurable, venereal disease. The lay public will, however, be interested

to learn that early syphilis can be cured and that late syphilis can be controlled. Such knowledge will at least encourage a person to consult a physician at the first evidence of infection and, in many instances, before such evidence is manifest.

It would seem, however, that proper education of physicians is of greater importance. From the standpoint of the syphilologist the knowledge of the disease possessed by the average physician is inadequate, but this opinion is not shared by the average physician. With the exception of clinics, there are probably more cases of syphilis treated by practitioners of general medicine than by syphilologists. The management of syphilis by the well instructed general practitioner should, in the opinion of the writer, be encouraged, but practitioners should have what few of them possess, namely, a reasonably thorough knowledge of syphilis and its management, together with technical skill. It is difficult to do much for the older practitioners, but something can be accomplished through postgraduate courses and at medical society meetings. At least such physicians can be encouraged either to become properly equipped or not to treat the disease. The main effort here should be to encourage early diagnosis.

Of greater importance is the proper education of undergraduate medical students. The student should be taught every phase of syphilis and the instruction should be thorough. During his four years in college and two years in the hospital, the student should be made to appreciate syphilis as a protean, infectious, constitutional disease, of great general, medical, and economic importance. He should become well acquainted with clinical diagnosis, differential diagnosis, clinical course, cutaneous, visceral, cardiovascular and cerebrospinal manifestations, and laboratory methods especially in regard to interpretation. In addition, the student

should receive adequate instruction relative to the general management of the disease including actual technical training (intravenous, intramuscular, and intraspinous injections in adults and children, etc.). He must be acquainted with indications and contraindications peculiar to the arsenicals, mercury, bismuth, and iodine when used for the treatment of syphilis. Prognosis, syphilis and marriage, congenital and acquired syphilis, extragenital syphilis, importance of early diagnosis and immediate adequate treatment, social service aspects, etc., should be included. In other words the course should be comprehensive and thorough. It is the consensus of opinion that such a course should be given by or be under the general supervision of a competent clinical dermatologist and syphilologist with the cooperation of laboratories and most of the departments in the medical college. Men and women trained in this manner will do much to reduce the incidence of syphilis and to prevent the terrible results of the disease. Finally, every clinic in the country should have a department in which syphilis is properly diagnosed and adequately treated, and in which there is a social service or follow-up system.

At the present writing, the foregoing outline covers, in a general way, preventive medicine in relation to syphilis. A great deal has been accomplished and a great deal more can be accomplished in the future along the same line of endeavor.

DISEASES DUE TO FUNGI

Dermatophytosis. The word dermatophytosis is now employed by many dermatologists in this country to indicate eczema-like eruptions due to fungi. The term includes eczema marginatum, eczematized ringworm, parasitic eczema, tinea cruris, epidermophytosis, etc. The most common locations are the hands and feet, crural, pubic, and anal regions, umbilicus, axillae, and under pendulous breasts.

Patches of the disease are encountered frequently on the extremities and trunk. It affects both adults and children, but it appears to be more common in the former. It is occasionally accompanied by a toxic rash called dermatophytide. The disease is most common on the hands and feet where three types are recognized: interdigital, vesicular, and keratoid. It is often difficult to demonstrate the fungus, so that very frequently diagnosis must depend on the clinical signs.

The affection is exceedingly common, especially on the hands and feet, and the number of cases appear to have increased at an enormous rate during the past ten years. It is probably that there has been an actual numerical increase, especially in large communities, but the increase may be due also to a much larger number of dermatologists and the fact that the disease is now recognized, whereas it was formerly called eczema and dermatitis venenata.

Presumably the affection is transmitted by direct contact and by mediate objects. It often exists for years between the toes before spreading to other parts. It is well to bear this in mind when making periodic health examinations.

The disease, as a rule, is very amenable to treatment although recurrences are the rule. Occasionally, it is exceedingly stubborn, disfiguring, and incapacitating. When the fungi attack the nails (onychomycosis) an affection is produced that is very disfiguring and exceedingly recalcitrant.

It is going to be difficult to irradicate this affection without advising impracticable and intolerable prophylactic measures. Frequent bathing, frequent change of underwear, sanitary towels and slippers, sanitary private, club, and public baths, sanitary manicure and tonsorial parlors, etc., will help. It is easy enough to advise one never to place the unprotected foot on the ground or floor, to wear slippers to the bath, and to have the slippers sterilized daily, but such advice is difficult to

follow. Certainly, every person who contracts this disease should be treated and reasonable care should be taken to avoid infecting others.

Tinea cruris (jock itch) may be secondary to dermatophytosis of the hands or feet, or it may be contracted from toilet seats, or by wearing infected jock-straps or trunks, using soiled towels, etc. The prophylactic measures are obvious.

Tinea circinata and *tinea tonsurans* are contracted from pets, poultry, cattle, humans, and infected articles. The indicated prophylactic measures consist of curing or killing infected animals, and temporary isolation of and prompt cure of patients. Ordinary ringworm of the skin will disappear usually as a result of a few applications of tincture of iodine. Ringworm of the scalp hair occurs practically only in children and may be promptly cured with *x*-rays or thallium acetate. The object of the treatment is to cause epilation, thereby getting rid of the fungi. Before the hair begins to fall out the scalp should be covered with zinc plaster. When the plaster is removed the hair is also removed and may be burned. Otherwise infected hairs may be scattered throughout the house, school, and neighborhood.

Favus, when it attacks the scalp, is more serious because it occurs in both children and adults, it is more stubborn, and it causes atrophy of the scalp and permanent alopecia. The disease should be detected early, the patient isolated and treated as for tinea tonsurans.

Tinea Barbae. Ringworm of the bearded region of adult males is contracted in much the same manner as tinea circinata and tinea tonsurans, but probably more frequently from the barber shop.

Blastomycosis and **Actinomycosis.** There is reason to believe that these are contracted from animals, straw and hay.

Sporotrichosis is thought to be derived from animals, plants, and unclean vegetables. Not very much is known regarding the method of transmission of other uncommon fungus diseases. Additional affections caused by fungi will be found in other sections of this chapter. Tropical diseases are not included.

DISEASES DUE TO ANIMAL PARASITES

Scabies and Pediculosis. These seldom obtain a foot-hold on persons who are able to keep clean. Under crowded and unsanitary conditions they spread rapidly and they may become serious because of complications. These affections spread through contact with infected subjects; also by means of inanimate objects such as soiled bed clothes. Preventive measures consist of sterilization of clothing, sheets, blankets, etc., frequent baths, and the application of antiparasitic ointments to the skin. Eggs attached to hairs can be dislodged with xylol and destroyed with mercury.

Creeping eruption (larva migrans) is encountered mostly in Russia and in the southern portion of the United States. The parasite inhabits the soil, especially damp warm sand, so that the affection is seem most frequently on the feet of those who do not wear shoes.

Dermatitis may be produced by a large number of insects, small animals, fish, etc.: flea, bed-bug, mosquito, black-fly, jelly-fish, etc. Preventive measures are so obvious that they need not be mentioned.

Diseases Due to Pyogenic Organisms. The common communicable members of this group are mentioned under the section dealing with sanitation in public places: impetigo, sycosis, etc. Boils are not considered to be contagious. In this affection prophylaxis is directed against the occurrence of additional lesions. It is thought by many that every boil is due to a local infection. Others believe that in some instances

the germs may spread through the blood stream. Preventive measures consist of improving the patient's general health, and protection against infection. Every physician knows that cases of acute erysipelas should be isolated. Chronic erysipelas, or lymphangitis, is not very contagious. Here it is necessary to search for the focus of infection.

SANITATION IN PUBLIC PLACES

Quite a number of skin diseases may be acquired in public places. Impetigo contagiosa, Bockhart's impetigo, sycosis vulgaris, tinea barbæ, tinea circinata, favus, molluscum contagiosum, syphilis, anthrax, seborrhea, and possibly boils are affections that might be contracted in barber shops in the absence of adequate sanitary regulations. Without proper sterilization of instruments and general cleanliness one may be infected with diseases such as syphilis, onychomycosis, paronychia, etc., while having the nails manicured. In addition to adequate sanitary regulations and their strict enforcement, it might be advisable to include the subject of sanitation in the curriculum of schools for barbers and manicurists.

Diseases such as molluscum contagiosum, impetigo contagiosa, tinea versicolor, scabies, pediculosis, etc., are probably occasionally contracted from the bed clothes in Pullman cars and ships. This indicates the necessity for greater care in enforcing sanitary regulations. These same diseases are acquired by athletes from gymnasium mats (wrestling mats, etc.).

Seborrhea may possibly be contracted in hat shops and in hair-dressing parlors as well as in barber shops and other places.

The abolition of the common drinking cup, the use of paper napkins, and the improved sanitation in restaurants and refreshment stands have undoubtedly helped to prevent the transmission of communicable diseases, especially syphilis

and Vincent's angina. However, there are many refreshment stands where the drinking glasses are incompletely cleansed. It is more difficult now for persons with active syphilis and leprosy to obtain employment in restaurants. While sanitation in public places, including toilets, is much better than in former years there is room for more improvement. Many public toilets are a disgrace and in such places the toilet seat is a real menace as here one may contract syphilis, gonorrhea, venereal warts, pediculosis pubis, molluscum contagiosum, ringworm, impetigo, possibly granuloma inguinale, chancroid, and other affections. Certainly toilets should be more carefully inspected, and they should all be provided with the open front toilet seat.

The disgraceful and indecent crowding on transportation lines, in addition to facilitating the communication of certain skin diseases, is in many ways inimical to the moral and physical health of those who are compelled to travel in this manner. The same, of course, may be said relative to the slums.

While on the subject of sanitation it may not be amiss to call attention to the fact that the majority of practising physicians are careless, from the standpoint of sanitation, in their routine office work. Very frequently nude or partly nude patients are placed on unclean tables and chairs; minor operations are performed and examinations are made with instruments and hands that have not been sterilized or even properly cleansed; protective material used in roentgen ray work very often is not sterilized; and there are many other faults of a similar nature. Conditions are, of course, much worse in many clinics. Dentists and prophylactic dental nurses are very careful, but close observation will demonstrate that their technic may be improved. For instance, a dentist will wash his hands before examining the teeth, and only sterilized instruments will be used.

The instruments are placed on a clean or even a sterile towel. But during the examination a pencil is used to record the findings on a chart; the same pencil is used through the day and perhaps indefinitely; it is never sterilized. Vincent's angina and other diseases may be transferred in this manner. If one were to enter into minute details, both the dental and medical professions could be severely criticized. Certainly, physicians and dentists should be most meticulous in carrying out sanitary requirements before a set of sanitary rules is directed against osteopaths and their ilk, chiropodists, masseurs, cosmetologists, barbers, manicurists, hair dressers, Turkish baths, hat shops, public conveyances, etc.

PUBLIC WELFARE WORK

Educational propaganda for the lay public, better medical education, increase of clinical and scientific knowledge, higher standards of living, public welfare work, legislation, better sanitation, and other factors have increased the average expectancy of life; some general diseases have been eradicated, the incidence of others has been reduced, and the mortality of many serious affections has been lessened. It is probable that these same factors have been and will continue to be instrumental in reducing the frequency and severity of many skin diseases: cancer, syphilis, leprosy, scurvy, tuberculosis, fungus diseases, pellagra, etc. Tuberculosis of the skin, for instance, is uncommon in tuberculosis health resorts. It is true that the mode of infection in lupus vulgaris and many of the cutaneous tuberculoses is not well understood, but even tuberculosis verrucosa cutis, which is certainly a local infection, is uncommon. This improvement may be ascribed to better care of tuberculous subjects, destruction of tuberculous cattle, improved sanitation in dissecting rooms, etc.

Better diet, destruction of foci of infection, lay knowledge of drug eruptions, more attention to the intestines, a better understanding of neurogenic and psychogenic influence, improved public health, etc., may in time reduce the number of cases of neurodermatitis, eczema, pemphigus, erythema multiforme, urticaria, dermatitis medicamentosa, neurotic excoriations, and other skin diseases and malingering.

Dermatitis Venenata. Dermatitis venenata may be defined as an inflammation of the skin caused by contact with some chemical (drug, plant, commercial product, etc.,) to which the person is idiosyncratic or sensitized. The eruption may be regarded as eczema. There is a very long list of substances that have been known to cause the affection. Perhaps the most common cause in many sections of the United States is poison ivy. Every person should be acquainted with the various poisonous members of the sumach family, particularly with Rhus toxicodendron (poison ivy) and Rhus venenata (poison oak). It would be a good idea to teach this subject in the public schools.

Poison ivy is a vine with a ternate leaf. It may crawl along the ground and be hidden by grass, or it may cover fences and trees. In some instances the strong stalks may grow vertically for several feet in which case the plant might look like a bush rather than a vine. At times it may cover a dead tree in a most deceptive manner. In the spring there is a cluster of tiny, yellowish-green flowers situated at the junction of the stem with the stalk. In the fall a group of dun-colored berries is found in the same location. The berries never turn red. The leaves, in the fall, are red and are often collected for this reason.

Poison oak is a shrub, a tree-like plant, that grows only in swamps, and which may attain a height of ten or twelve feet. The spring flowers and the fall fruit are similar in appearance and location to those of poison ivy only that

they are larger and are at the end of a long, slender, drooping stem. The leaves are arranged in seven pairs on a long stem.

Staghorn sumach, found abundantly along the country roadside, with a large cluster of berries at the extremity of the stalks, is not poisonous, neither is the graceful Virginia creeper, nor the so-called winter ivy.

While not definitely proved, it is possible that rhus dermatitis can be contracted by indirect contact—insects, smoke, etc. It appears to be autoinoculable, but it cannot be passed from one person to another. Lacquer sometimes contains the toxic principle of poison ivy and many cases of dermatitis venenata have been caused by handling lacquer, shellac, and lacquered objects.

In some instances it is possible to immunize a person temporarily by means of tincture of Rhus toxicodendron internally (Schamberg) or by giving one or two injections of Strickler's poison ivy extract. The directions for the use of these remedies are in all modern text-books on dermatology. The beautiful *primrose* is another common cause of dermatitis venenata, so common indeed that it might be a good idea to exterminate the poisonous members of this plant.

There is a very long list of substances that have been known to cause dermatitis venenata, most of which are found in the trades. This particular phase of the subject has been thoroughly discussed in many articles on trade eczema and industrial dermatoses. The principal substances are volatile oils, resinous woods, lacquer, shellac, formalin, dyes, crude oil, phosphorus, turpentine, tar, lime, lye, strong soap, plants, chrysarobin, sulphur, acids, leather, and many, many others. A fairly complete list may be found in most of the large dermatological textbooks.

In this connection, it might be stated that there is a very large list of drugs that when injected or ingested, will cause

eruptions in idiosyncratic persons (dermatitis medicamentosa). The principal drugs in this group are: arsenic, iodine, bromine, copaiba, phenolphthalein, quinine, coal-tar products, etc. A complete list may be found in textbooks on dermatology.

The safety match box has been the cause of many cases of dermatitis venenata in those who carry the box in a pocket of the trousers. If the person sweats, the substance (possibly phosphorus) used to ignite the match, is carried through the cloth and causes dermatitis in susceptible subjects. The etiology of this condition was unknown until discovered by G. H. Fox. The same statement might be made for many dermatoses that are now grouped under the general heading of dermatitis venenata.

Dermatitis venenata is occasionally caused by cosmetics, hair dyes, and so-called hair tonics. This fact has caused a great deal of discussion, much of which is rather foolish. It seems ridiculous and it is apt to be useless to condemn a desirable article because an occasional person is idiosyncratic. If this were done physicians would be limited to very few remedies. There are relatively few drugs and chemicals used by the medical profession to which an occasional person is not idiosyncratic. One might argue that a physician possesses this knowledge and is always on the alert for idiosyncrasy, and that he is obliged to employ these remedies therapeutically. These statements are only partly true. Very few physicians are cognizant of all the possibilities and ramifications of idiosyncrasy, sensitization, susceptibility, allergy, etc. There is no positive way to detect idiosyncrasy previous to the use of a remedy for therapeutic purposes. Physicians are obliged to take a chance and so are patients. As a rule the physician does not think of the possibility of idiosyncrasy unless he is dealing with a substance that is notorious in this respect. For

instance, resorcin occasionally causes dermatitis venenata, but it is very useful drug; it is employed almost daily by every dermatologist, and it is seldom that the patient is warned against the possibility of its causing dermatitis venenata. Such a warning would not prevent the advent of dermatitis, although the patient would probably discontinue the remedy at the first sign of trouble. It would necessitate a dissertation on idiosyncrasy almost every time a prescription is written, otherwise many patients would be unnecessarily apprehensive. Resorcin, in addition to causing occasional dermatitis, quite often discolors the hair. This happens so frequently in persons with light hair that the drug is employed, as a scalp lotion, only in dark haired subjects, and even dark hair has been known to turn color under the influence of the drug. A combination of resorcin and formalin will change the color of dark hair in a large percentage of cases. This last fact is known to only a few dermatologists even.

Barbers, cosmetologists, and people in general use scalp lotions, cosmetics, ointments, liniments, laxatives, headache remedies, etc., that contain the chemicals that physicians prescribe daily. Florists sell primrose plants, merchants sell lacquered ornaments, dyed goods, and many other things that may cause dermatitis venenata. Even the rotogravure sections of the Sunday newspapers have been known to cause the affection; so have insect powder, home remedies, etc., etc. It would, indeed, be ludicrous to attempt to prevent the sale and use of all these desirable and even necessary articles.

Something, however, might be accomplished by regulating the sale of such articles to the public. Legislation might prevent the use of the word harmless, the erroneous employment of which is often due to ignorance rather than intent to deceive. It might be desirable to compel the publication

of formulas, or to provide a list of chemicals falling in this category that must be printed on the label if one or several of them are contained in the remedy.

Something might be gained, also, by education of the general public, although this should be done with care and under the supervision of altruistic organizations. The public is going to continue to use cosmetics, dyes, dyed articles, and all the other substances mentioned in this chapter, regardless of legislation and advice to the contrary, and there is no good reason why such articles and remedies should not be at their command. It is ridiculous to state, as has been done by those who should know better, that women ruin their complexions by using cosmetics. Women have used all sorts of cosmetics for three or four thousand years or longer, and their complexions are better, as a rule, than those of the opposite sex. However, it is well for the public to know the facts, and such facts, not impressions, should be presented in such manner as to avoid chaos and unnecessary fear. Furthermore, people should be made to understand that they must assume some of the risk. The courts are crowded with ridiculous and unfair actions against physicians, cosmetologists, merchants, and others. This crowding of the courts suggests many things among which is that there is a very large proportion of "poor sports" in this country. Before anything is done in the way of legislation or educational propaganda, it might be a good idea to have the question thoroughly studied by a committee composed of dermatologists, chemists, internists, etc.

Cold. Solid carbon dioxide (CO_2 snow) is now used in ice cream cartons, but not entirely without danger, as demonstrated by the case of a patient who fell asleep with the carton in her lap; the result was a third-degree "burn." Solid carbon dioxide has a temperature below zero and it is employed by dermatologists to remove various lesions of

the skin. Contact with the skin for a few seconds will cause dermatitis; contact for a few more seconds results in blistering; a little longer application will produce ulceration followed by a scar. It is a somewhat dangerous substance to have in the house, especially in the presence of children. A small piece might come in contact with the eyeball and cause serious damage. It would seem advisable at least to use caution labels.

The improper use of ice bags and ice compresses may cause gangrene, especially of the extremities. Long continued exposure to cold may, as is well known, result in pernio, and vasomotor and sensory disturbances. In passing, it may be stated that certain chemicals, such as carbolic acid, copper, etc., even when in weak solutions, may cause gangrene when applied to the fingers and toes as a constant wet dressing.

Light and Heat. In the section on precancerous dermatoses mention was made of farmer's skin and sailor's skin, also radiodermatitis. In recent years there has developed a fad for sunlight and ultraviolet light. One hesitates to warn against such useful, natural, and necessary agents. However, too much light may be injurious to the skin, the eyes, and the general health. Strong doses may provoke an exacerbation of a quiescent disease, such as lupus erythematosus, eczema, or psoriasis, while small doses may prove beneficial. Herpes may be precipitated by exposure to ultraviolet radiation and erythema solare is caused in this manner. It is not within the scope of this article to give the indications for and against heliotherapy and ultraviolet light therapy; but it is well simply to state that the injudicious use of such agents may be injurious and that they should be used only by the request and under the supervision of an ethical practitioner of medicine.

Applications of heat may cause a peculiar and disfiguring mottled pigmentation and erythema of the skin known

as *erythema ab igne*. This affection has been provoked by hot water bottles, by close proximity to hot radiators, etc.

Keloids. Of course there is no way to determine, antecedent to an injury, whether or not a person has a keloidal tendency. However, keloids and hypertrophic scars are so common that it would seem as though every surgeon would inspect the surgical scar frequently for a month or two. Roentgen rays or radium will prevent this formation if applied at the first indication of infiltration.

Acne and Seborrhea. Acne vulgaris is, to quite an extent, preventable. The majority of cases begin as papules and comedones at the age of puberty. This is the time to instruct such patients relative to sex hygiene, skin and general hygiene, and diet, to correct any general health fault, and to apply "chapping" lotions to the affected areas. If this is done hundreds and thousands of persons will be spared a severe, long-continued, humiliating eruption and a coarse, scarred, oily skin. Also, certain undesirable alterations in disposition and temperament and psychic injuries will be avoided.

While rosacea may be caused by disturbances in the gastrointestinal tract and reproductive organs, many cases are due to indulgence in tea and alcohol. This very disfiguring and humiliating condition can be prevented often by abstaining, absolutely, from tea or alcohol or both.

It is the consensus of opinion that seborrhea (dermatitis seborrheica, dandruff, oily seborrhea, pityriasis capitis, etc.,) is caused by bacteria or fungi or both, and that it is a communicable disease. Some persons seem to be immune. The affection is so prevalent and the causative organisms are so universally distributed, that it seems probable that every susceptible person becomes infected. It does, therefore, appear rather hopeless to eradicate this particular cause of

baldness. Sanitation in barber shops and other public places, and in the home, and the treatment of all cases, is about all that can be done.

Verruca. The cause of most types of verruca is unknown. With the exception of the senile wart and possibly the seborrheic wart, it is probable that most warts are caused by bacteria and that some of them are communicable. Plantar warts appear to be most common among those who go barefooted in college, club, and public baths. The venereal wart was mentioned in the section on public sanitation. It is possible that improved sanitation may reduce the incidence of many varieties of warts.

CHAPTER XVII

UROLOGY

J. Bentley Squier, M.D.

SINCE preventive medicine is basically dependent upon the early recognition of beginning signs and symptoms of disease, it finds a peculiarly fertile field in urology. There are but few branches of medicine which equal urology in exactitude of diagnostic methods, and which in consequence offer as great an opportunity to detect disease process in their incipiency.

Diagnostic Aids. In the diagnosis of urological conditions, both examination of physical signs and estimations of functional efficiency, the two primary avenues of diagnosis, have reached an unusually high degree of refinement. In hardly any other bodily tract is it possible, for example, to visualize almost the entire tract, the kidneys and ureters by means of the roentgen ray, and the bladder wall by the use of the cystoscope. Again, the fact that the excretory product of the urinary tract, the urine, is not only easy of collection, but lends itself very readily to chemical, microscopic, and bacteriological examination, has led to the accumulation of invaluable data as to the physiological and chemical activities of the kidneys both in health and in disease. The cystoscope, moreover, has made the analysis of the urine an even more exact aid to diagnosis than ever before, in that by means of this instrument each kidney may be catheterized separately, and thus the activities of each kidney may be separately appraised. Furthermore, the presence of any abnormal substance in the urine, such as pus or red blood cells, may, by the aid of the cystoscope, be traced all the way up the urinary tract, to each individual

kidney if necessary, until the precise pathological focus is discovered. The cystoscope, has made possible too the pyelogram by means of which the outline of the kidney and its calices may be visualized, its size and shape determined, and foreign bodies, such as calculi which are of too low a density to cast roentgen ray shadow, detected.

From the standpoint of the earliest possible diagnosis of disease, which is one of the fundamental principles of preventive medicine, every indication of abnormality of function, be it ever so slight, merits serious consideration. The examining physician should therefore make his clinical history and physical examination as complete as possible, availing himself of every diagnostic aid. In dealing with acute conditions, and more especially with patients under observation in the hospital, much is learned with reference to the patient's symptom complex, of which he himself is often entirely unaware. When a patient, however, who feels perfectly well presents himself for a periodic health examination, much that is important can be obtained only through careful and patient questioning. Indeed, it is often the history alone, rather than the physical examination, which may be depended upon to indicate possible laboratory tests or diagnostic procedures essential to the discovery of early changes in the normal physiological and biochemical reactions in the body.

Of special importance for the recognition of pathological conditions in the urinary tract is the fact that unusually effective methods have been developed for estimating renal efficiency. For no other organ of the body, perhaps, have the laboratory tests for the very early detection of impairment of function been so highly developed as in the well known function tests. The further fact that the waste products of metabolism, when not adequately excreted by the kidneys, are found in the blood in excess concentrations

makes the analysis of the blood an added aid to the discovery of the impairment of kidney function. As regards the bladder, quantitative estimations of residual urine, which can be readily made by any practitioner, not only will often throw considerable light upon the ability of this organ to function normally, but may also give a clue to pathological conditions in other parts of the urinary tract, such as ureteral stricture, prostatic enlargement, and the like.

Functional impairment of the urinary mechanism, as revealed by the numerous diagnostic procedures thus available not merely to the urologist but, in many instances, to the general practitioner, is of vital importance; for the impairment in the ability of any organ of the body to function normally is one of the first indications that pathological changes are beginning to take place in the histological structure of that organ. These changes are at first microscopic. If permitted to go on unchecked, however, these microscopic pathological lesions usually tend to be progressive, involving more and more of the parenchyma of the organ, until its functional activities may have become so much impaired as to threaten life itself. It is the recognition of this fact that has prompted those interested in the prevention of disease to center much of their attention upon the development of accurate clinical and laboratory methods for the early detection of these functional changes.

The Urological Aspects of the Health Examination. The outstanding importance of the health examination in the prevention of disease is no longer a matter for question. Equally well recognized is the fact that no health examination is complete without a thorough investigation of the entire urinary mechanism. The usual routine examination of the urine for sugar and albumin cannot be regarded as in any sense adequate to this purpose. While the detailed procedure to be followed in such an examination cannot be rehearsed

at this time—it is to be found fully set forth in standard works on the subject—a few considerations may, however, be emphasized.

The taking of a careful and complete *urinary history* is perhaps the most important single element in the examination, and the one which is so often slighted. It must be borne in mind that many patients pay little attention to symptoms such as nocturia, dysuria, frequency of urination, urgency, polyuria, or even hematuria (if this ceases spontaneously, and does not recur) until those symptoms merge into either severe pain or great annoyance. It is well to remember that a single symptom, such as nocturia—a condition which the patient may regard as entirely normal, or as too trivial to mention unsolicited—may be the earliest indication of incipient nephritis, or, on the other hand, in a male over forty years of age, may be the first indication of beginning enlargement of the prostate. While any of these symptoms may, in a given case, be indicative merely of some minor disturbances in the urinary tract, they may on the other hand portend such things as nephritis, calculus, tumor, or even tuberculosis. They require, therefore, that a most careful investigation be made in every instance. It takes careful questioning, however, to elicit this information from the patient and bring it to the attention of the examining physician.

Polyuria, even when continuous, and slight oliguria are among the symptoms which frequently go entirely unnoticed by the patient or are regarded by him as too unimportant to mention. A careful and complete history should elicit the presence or absence of this condition. Even if entirely of nervous origin, involving no impairment of renal function, the fact of its presence should be known to the physician who is attempting to appraise as accurately as possible, and envisage in its entirety, the general health status of his patient at the time of the health examination.

Continuous polyuria may, however, be one of the early signs of beginning destruction of renal tissue resulting from such conditions as urinary obstruction, calculosis, or even tuberculosis. If such pathological conditions are present it will usually be possible to demonstrate beginning impairment of renal function by the appropriate function tests. Such a patient should be kept under observation and all diagnostic methods utilized, with a view to establishing the etiology. It is the early awareness of such conditions together with an intelligent alertness to the possibilities of further and more serious renal damage which play the determining role in its prevention.

The *examination of the urine* which is limited to the usual routine tests for albumin and sugar cannot, as has already been stated, be regarded in any sense as adequate for the investigation of the urinary tract, as part of the health examination. Without going into any of the well known urinary tests in detail, it would seem desirable to emphasize the fact that a determination of the acidity of the urine, and its specific gravity, as well as the complete microscopic examination of the sediment should be undertaken as a matter of routine, even in the absence of albumin or other definite indications. Any evidence of renal insufficiency, manifested by a persistently low or decreasing specific gravity; or of possible infection as evidenced by changes in the acidity of the urine, or the presence of pus or red blood cells, warrants a thoroughgoing investigation of the urinary tract as a whole at the earliest possible date. It must be remembered with reference to hematuria particularly, whether macroscopic or microscopic in amount, that it is always a signal that pathological processes are at work in the urinary tract. These processes may be the result of an acute or chronic inflammatory reaction in the tissues which is invading the nearby capillaries, due either to infection,

tumor formation, or mechanical irritation resulting from the presence of one or more calculi.

Whatever the cause, the presence of pus or red blood cells should be traced back through the urinary tract by means of the cystoscope to each individual kidney if necessary until the source of the trouble has been satisfactorily established. The roentgen-ray and the pyelogram will be of invaluable assistance in these cases. Bacteriological examination of the urine as well as the various renal function tests as further aids to diagnosis are all too well known to receive more than passing mention.

An important part of every health examination is an investigation of the teeth, tonsils, sinuses, etc. for possible *foci of infection*, particularly if there is some special indication such as pain of a rheumatic character. In hunting for such foci of infection, the urinary tract is frequently overlooked. It must be remembered that not only may one get infections of the urinary tract secondary to foci in other parts of the body, but that the urinary tract may, in itself, constitute the primary focus of infection in a given case; the seminal vesicles, the bladder, and the kidneys being the principal offenders. Infections anywhere along the urinary tract, however, should be looked for. A low grade infection of the bladder or the kidney pelvis may be the focus in question. Pus in the urine should always be looked for, and, when found, should be carefully traced back to its source of origin in the urinary tract. It is well to bear in mind the fact that pyuria is known to be associated with perineal and lumbar pain, as well as pain in the extremities, closely resembling rheumatism.

General visceroptosis, as found in the routine health examination, is of interest from the standpoint of urology only in so far as it might involve one or both kidneys in the process, thereby interfering with their normal circulation and drain-

age. Such interference may give rise to urinary symptoms, and the general visceroptosis should be corrected in the usual manner in order that normal kidney function be preserved.

The Early Detection of Specific Urological Conditions. The early detection of urological conditions is of primary importance from the standpoint of prophylactic treatment or procedures as well as from the standpoint of preventive medicine in general. While it is manifestly impossible at this time to discuss any great number of these conditions, a few of the more important ones are being presented from the point of view of their preventive health aspects.

Neoplasms. The early diagnosis of neoplasms of the urinary tract is frequently largely dependent upon the urinary history. Fortunately, neoplasms of the urinary tract grow slowly and metastasize late. Unfortunately however they are frequently symptomless for a long time, and for that reason are often not discovered early enough. This is particularly true of papillomata of the bladder. It is well to remember that hematuria may be the only symptom of this condition, but it is a very characteristic one. It would be extreme of course to recommend that every health examination include a cystoscopic examination of the bladder. However, if every case presenting suggestive signs and symptoms were thoroughly worked up from a urological point of view, many more cases of malignancy would be discovered at a sufficiently early stage to permit of satisfactory surgical removal than is the case at the present time. The early recognition and removal of papillomata of the bladder is extremely important because malignant degeneration in these cases is not uncommon.

It is well to bear in mind in connection with neoplasms of the urinary tract, that a varicocele of short duration, on the left side, in a man over middle age justifies the suspicion of a new growth of the kidney, with secondary invasion of the renal and spermatic veins.

Tuberculosis. Again, the early detection of tuberculosis of the kidney is dependent largely upon the history and a careful examination of the urinary sediment. Renal tuberculosis may be very insidious in its development, manifesting itself only in such symptoms as frequency of urination, polyuria, urgency, or nocturia. Indeed, in cases where the ureter is occluded, pyuria and hematuria may both be absent, the urine for the time being giving no clue to the diagnosis. In every suspected case, the urine should always be examined for the presence of blood. The presence of macroscopic or microscopic blood in the urine, especially if accompanied by pus cells is a danger signal. While in no sense pathognomonic of tuberculosis of the kidney, their presence in the urine should warrant a thorough investigation of the urinary tract from every point of view, by roentgen ray, cystoscope, functional kidney tests, blood chemistry, and, most important of all, an examination of the urine for the presence of the tubercle bacillus, with injection of the urine into a guinea pig if necessary. The presence of a known tuberculous focus elsewhere in the body should always direct attention to the urinary tract. The kidneys of such a person should be watched with the greatest of care as a routine procedure, in order that a secondary tuberculous infection there may be detected at the earliest possible moment.

From the standpoint of preventive medicine, the early detection of tuberculosis of the kidneys is perhaps as important as the early diagnosis of malignancy. Surgical removal of a tuberculous kidney, while a serious operation, is nevertheless life-saving if such removal can be affected before the other kidney has become involved in this process.

While hematuria, either microscopic or macroscopic, is associated with tuberculosis of the kidneys, it has been reported also in 75 per cent of all cases of malignancy of these organs. It is associated also with calculus and with

infections of the urinary tract. These conditions may occur, however, even in the absence of either red blood cells or pus in the urine, and consequently all symptoms with reference to the urinary tract as brought out by the history (be they ever so vague, mild, or apparently transient) merit very serious investigation. The importance of a careful urological history is again significantly disclosed.

Urinary calculus is usually thought of in terms of one or more acute attacks of renal colic. The fact of its insidious development in certain cases in the complete absence of symptoms, or the possibility of its manifesting itself in very low grade symptoms only, such as a dull ache in the back, is not so well known. A history of intermittent attacks of hematuria, even though separated by long intervals and possibly long forgotten by the patient but elicited only after careful questioning, should suggest the possibility of calculus even in the absence of abnormal symptoms or urinary findings at the time of a particular examination.

Since the etiology of calculus formation in the urinary tract is not thoroughly understood as yet, prophylactic measures must necessarily be unsatisfactory. Briefly summarizing the situation, however, it may be said that among the factors which are regarded as of greatest importance are alterations in the normal metabolic processes in the body; biochemical and physicochemical changes resulting in the precipitation from the supersaturated urinary solution of salts not normally so precipitated; and infectious agents at work in the urinary tract, or any combination of these factors. While relatively little can be suggested in the direction of permanently altering any abnormal biochemical and physicochemical relationships in the body, much can be done to eliminate infection. Furthermore it is well to realize that stones in the urinary tract—even if they are unaccompanied by acute symptoms—tend to grow in size

as the years go on. If permitted to remain long enough, very serious and often irreparable renal damage may be done. Coral stones, for example, have been found to have grown to such size that the renal parenchyma was reduced to a mere shell-like functionless covering for the stone. The early diagnosis of calculus in the urinary tract and its removal, unless there is some contraindication, before too much renal tissue has been permanently destroyed may be a life-saving measure. This is particularly true if the calculi happen to be bilateral which they are, it is estimated, in about 15 per cent of the cases.

While stricture of the urethra or the ureter may be congenital or due to inflammation or trauma, it occurs most frequently as the result of chronic inflammation due to *gonorrheal infection*. Stricture of the urethra, while in itself relatively unimportant, becomes supremely important through its interference with kidney drainage. As a result of this interference a number of serious complications and pathological conditions in the urinary tract may result, only a few of the most important of which can be mentioned at this time. Its immediate effect is to predispose to urinary stasis. As a result of this, the urinary tract is laid open to many septic complications such as cystitis, pyelitis, pyelonephritis, chronic prostatitis, and the like. The gonococcus enters the prostate gland by way of the prostatic ducts, and in this way an inflammatory process is produced, which, while it may end in resolution, is more apt to result in chronic prostatitis or acute suppuration. Urinary stasis, it is further believed, may be one of the etiological factors in the production of urinary calculus.

The function of preventive medicine in the venereal diseases is primarily that of public health education in questions of proper sex hygiene, etc. All of this, however, is outside the field of urology. It is to the early treatment of such cases

that the urologist is prepared to turn his attention, with a view not merely to effect the speediest possible removal of signs of infection from the urinary tract, but also for the further purpose of preventing the formation of strictures which so often complicate these infections. It must be borne in mind that the longer the inflammatory process is permitted to go on, the greater are the chances of stricture formation.

Retention of Urine. While acute retention of urine would not ordinarily be brought to the attention of a physician in the course of a routine health examination, he may, if he is alert to the possibilities in this direction, observe beginning indications of low grade urinary stasis, particularly if he is in the habit of taking a careful history. The importance of the early detection of residual urine cannot be over-emphasized from the standpoint of prophylaxis and the prevention of more serious disease processes. It may be due to a number of things, the principal ones being obstruction to proper urinary drainage as a result of an enlarged prostate, renal or ureteral calculus, malignant disease, stricture, or pelvic tumors causing pressure upon the urinary apparatus from without; it may also be the result of infection anywhere along the urinary tract; again, it may be due to atony of the bladder wall associated with diseases of the nervous system such as tabes, etc., or, it may be, idiopathic (*i.e.* without the existence of any nervous disease). When one considers the multitude of causes and pathological conditions which may be accompanied by urinary retention, and the accumulation of residual urine in the bladder, one can appreciate how important it is to obtain an early knowledge of this condition —so apparently innocuous in its early stages.

Enlargement of the Prostate. No health examination is complete in a man over forty years of age without a rectal examination for enlargement of the prostate. The fact that

such a rectal examination, however, can reveal enlargement of only one or both of the lateral lobes only, is often overlooked. The prostate may be symmetrically enlarged as a whole or there may be an asymmetrical enlargement of any portion thereof. It may be either hard or soft. Examination by rectum will, if the lateral lobes are enlarged, reveal the presence of a hard or soft tumor mass which is usually smooth, and over which the mucous membrane of the rectum will be found to move freely. Enlargement of the middle lobe, however, cannot be felt by rectal examination, but can readily be seen with the aid of the cystoscope.

In all cases, therefore, where rectal examination is negative and there is any cause to believe that there may be prostatic enlargement, attention should be carefully directed towards any signs or symptoms of beginning obstruction in the urinary tract. These early signs and symptoms are essentially nocturia and an increasing difficulty in micturition during the day. These symptoms may be very slight in the beginning, and can often be brought out only by a careful history and an examination of the patient for the presence of residual urine.

While enlargement of the prostate gland, which is so common in men of middle life, has no intrinsic importance *per se*, its importance lies in the fact of its interference with urinary drainage because of the anatomical position of the gland. Inasmuch as the etiology of enlargement of the prostate is as yet entirely obscure, prophylactic measures cannot be instituted very successfully. However, with the early detection of such enlargement much can be done to forestall future damage to the kidneys resulting from chronic retention of urine due to poor drainage complicated by secondary infection. The early diagnosis of this condition, associated with proper medical supervision and suitable operative treatment when indicated, can accomplish a great

deal in the direction of the protection of the urinary tract as a whole from injury.

Education of the Public. The general public is being educated to the importance of the periodic health examination. It is being further educated to the importance of cancer prevention, and the desirability of seeking early medical advice with reference to any newgrowth. Education with reference to the prevention of venereal disease is also going forward. All three of these movements are contributing not a little to preventive medicine as applied to urology. To these, however, should be added the further endeavor to educate the public to the importance of even minor symptoms referable to the urinary tract such as nocturia, dysuria, frequency of urination and urgency, to which so little consideration is paid at the present time. It is believed that were proper attention given to these apparently harmless symptoms, and were the public made aware of the necessity for consulting a physician with reference to them, great strides would be taken toward the prevention of the more serious disturbances of the urinary mechanism.

CHAPTER XVIII

VENEREAL DISEASE

JAMES PEDERSEN, M.D.

SYPHILIS, gonorrhea, and chancroid have always been fundamentally preventable diseases; nevertheless, they continue to be among the most prevalent that attach themselves to the human body. They have always been preventable because they are typically contagious diseases, in that direct and intimate contact with the body of an already infected person is practically always the way and means of their transmission. They remain prevalent because the direct and intimate contact occurs in response to the second most imperious impulse of human nature, and because impulse is seldom controlled by reason.

This major fact of their transmission is particularly true of chancroid; it is nearly as true of gonorrhea (specifically gonococcal urethritis); it is only measurably less true of syphilis. By this we mean that chancroid practically never occurs in clinical practice except in consequence of direct sexual contact; that the presence of true gonorrhea is practically an invariably presumptive proof of direct contact with an identical genital infection, an indirect or mediate infection being exceedingly rare; that syphilis, while commonly betraying the same causative factor as do chancroid and true gonorrhea, differs from them in compelling us to admit that it is sometimes conveyed by an intermediary: infected pins, pencils, and penholders held in the mouth, table utensils insufficiently washed, deficiently sterilized surgical and dental instruments, and a bite by a syphilitic having active lesions in the mouth at the time. Surgeons have too often been victims of a syphilitic patient, through

apparently trivial wounds received at the examining table or in the course of an operation.

Theoretically, therefore, the venereal diseases are among the most preventable; practically and clinically, however, their prevention has to be rated in small figures. As a matter of course, exact figures cannot be given. It is only within recent years that the venereal diseases have become reportable to departments of health, and not until a generation has passed will a comparison of statistics be conclusive.

Next to their transmission, in the problem of prevention, stands their curability.

Chancroid, being a locally limited manifestation of an infection, is always amenable to appropriate treatment and its average duration is short. Because of this, and of the fact that although chancroid occurs today only in the lowest, most indifferent class of patients, nevertheless its pain induces the infected man to refrain from coitus until the lesion is healed, chancroid exerts its own prevention against further transmission by him; though the woman from whom he contracted the infection may go on infecting other men until hospitalized and cured.

It is bad practice to cauterize a chancroid until we are as sure as possible that the secretion from the ulcerating surface contains no spirochete of syphilis. Cauterization promptly thickens or hardens the base of the ulcer, thereby masking the physical signs, and it more or less effectually destroys the spirochete and prevents control tests. Thus we are doubly handicapped in discovering promptly whether the patient has received two infecting organisms: the Ducrey bacillus plus the *Treponema pallidum.*

When cauterization is indicated and when it has been proven permissible, the ulcer should be anesthetized by smothering it with a film of cotton saturated with a 10 per cent solution of cocaine. The cauterizing agent may be any one of several, provided it be thoroughly applied, yet not so

freely as to destroy healthy tissue. Thereafter, the milder antiseptic solutions under a dressing and good drainage are in order. A thin paste, made by softening a few crystals of argyrol in 2 c.c. of water, applied every second or third day and left in place for from ten to fifteen minutes, has been efficacious. In the reparative stage (sometimes earlier) aristol is ideal.

The curability of *gonorrhea* is practically absolute and final, provided properly regulated treatment be begun with the onset of symptoms. Beyond any doubt, gonococcal urethritis can be prevented by filling the anterior urethra to moderate distention with a 1 per cent solution of protargol, a 20 per cent solution of argyrol, or a 1:3000 solution of mercurochrome, if this prophylaxis can be applied not later than eight hours after the exposure to infection. The protargol solution or the corresponding one of argyrol should be held in the urethra for from five to ten minutes; the solution of mercurochrome for from ten to twenty minutes. It is important not to over-irritate the urethra, still more important not to cauterize it; therefore, the prophylactic injection should be let escape from the urethra as soon as the patient notices a sharp stinging sensation. In that case, the injection should be repeated three hours later, a weaker solution being used.

If more than eight hours have elapsed since the exposure, the attempt at prevention should be made by giving the injection and by repeating it every four hours during the next twenty-four. The object being to destroy the gonococci without denuding the urethra of its epithelial protection, it is more than ever important not to use the solution so strong as even mildly to cauterize the mucous membrane. A relatively weak injection repeated several times is more effective than a stronger injection used only once or twice. This rule in favor of the weak solution for the injection

should govern the further treatment of those cases that develop the usual symptoms and run the usual course, in spite of our attempts to prevent the gonococcus from invading the mucous membrane. Fortunately, some of these cases run a shorter course than the typical, apparently because of our preventive treatment, backed perhaps by the patient's native resistance to the disease and his cooperation in carrying out the general treatment faithfully. Perhaps also the infection he received was a mild one.

While the curability of gonococcal infection of the urethra is absolute and final under the conditions outlined in the foregoing, we have to recognize that a careless patient of feeble resistance who happens to have received an extra virulent strain of the infecting organism, may be a "carrier" of gonococci in a latent state for an indeterminable time. In the interests of prevention, therefore, it is our duty not to dismiss any patient as "cured" without subjecting him to certain tests. This applies especially to one who has had an intractable infection, with or without the salient complications of prostatitis and seminal vesiculitis.

According to our present knowledge, the accepted tests are two. They should not be made until two weeks have elapsed after all treatment was stopped, assuming no return of objective symptoms during that period. (1) By injecting 20 minums of a 0.4 per cent silver nitrate solution into the anterior urethra by means of a syringe-sound, and, a week later, 5 minums of a 1 per cent solution, more or less urethral discharge is excited for examination under the microscope and by plate culture. (2) Material expressed from the prostate and the seminal vesicles is caught on a similar plate, incubated, and examined. These tests call for the cooperation of an expert bacteriologist; being an expert, he will emphasize the fact that one negative culture is never conclusive. Two negative cultures, anywhere from one to six weeks

apart, should be demanded of the patient before he is dismissed from observation. Even under those satisfactory conditions he should be cautioned against the excesses that cause hyperemia and congestion of the genital mucous membrane: excessive indulgence in alcoholics and coffee, rich food in large amounts, and sexual excess.

The curability of *syphilis* and the prevention of the disease by early diagnosis and treatment have been fully discussed and ably set forth in another contribution to this series of papers. There remain, in consequence, only certain general considerations for the final paragraphs here.

A patient, suddenly confronted by a diagnosis of syphilis, is naturally alarmed, especially if married, and is likely to seek for details on how to insure the family against the infection. After prohibiting coitus and kissing (except on the sound and healthy skin), it is our duty to be reassuring in what we say. There is nothing to be gained by keeping the patient in a state of panic. For the sake of brevity and clearness, we shall assume that a male member of the family is the patient, as is, indeed, usually the case.

We are to tell him that kissing the lips is forbidden altogether until we are able to assure ourselves that his syphilis is thoroughly under control, as indicated by the disease in his individual case and as measured by the serologic tests of the blood and the spinal fluid. We are to tell him that meanwhile kissing the sound and healthy skin is permitted, provided there be no "sores" in the mouth or on his lips, nor any fissures of the lips. Though it is true that the liability of inoculation through the unbroken skin or mucous membrane is remote, he should nevertheless be cautioned. Instances of syphilis conveyed by such articles as pipes, penholders, and pencils that were held in the mouth, should be explained to him in the interests of prevention. On the other hand, he should be told that hot water and soap make tableware safe

for use by others. Drinking glasses and cups are included in this category; but to make assurance doubly sure, he should be shown how to drink by putting his lips over the edge of the cup or the glass, instead of taking the edge between his lips. He is almost sure to ask about the danger to others if he uses the bathtub and the toilet-seat. The free dilution supplied by the bath water, and the ordinary everyday household cleansing which the tub and the toilet receive, give the answer to this groundless fear.

If he be the victim of a urethritis in the acute or subacute stage, he should be required to urinate and to use the hand injection before stepping into the bath. The modern bathroom fixtures are so designed as to make contamination of the toilet seat almost impossible; nevertheless, he may as well take extra care to avoid contact between the meatus and the toilet seat as an additional precaution, especially if there be female children in the family. A protective dressing day and night will prevent the bed linen and his clothing from becoming contaminated; but the dressing should not interfere with free drainage from the urethra. Not infrequently both the patient and his physician, overlooking the advantage of free drainage, protract the course of a urethritis by applying a dressing that constricts the urethra.

Every physician to whose lot has fallen the treatment of patients with venereal disease cannot but lament that prevention is not exercised more frequently through self-control, or failing that, if infection has taken place, that prophylactic measures are not made use of. Literally, the whole subject in all its aspects is an enormous problem and exceedingly complex. As already said, theoretically and from the bacteriologic standpoint, the venereal diseases are wholly preventable, but practically and from the biologic standpoint, they are not. In normal physiologic conditions, sexual indulgence for the unmarried is not a

compulsory necessity. To some, continence before marriage is not impossible and is compatible with perfect health. To others, continence is difficult. To a third group, continence seems impossible; to them the sexual relation seems to be an extra-imperious necessity. They are, however, not necessarily more vigorous than their brothers and sisters. Some of them are of fine physique and splendid mentality, while others are the opposite. We have to recognize them as the over-sexed individuals, physiologically preponderant in the sexual sphere. To them, no criticism attaches; nevertheless, there lurks a suspicion that a proportion of the members of that group have become over-sexed artificially. Lack of correct information during their plastic years; a surplus of wrong information during their adolescence; still later, a little later, an easy-going willingness to discard self-control in favor of self-expression, based on a dangerously little knowledge eagerly absorbed from the exaggerated small talk of the results of "repression"—these seem to be the factors that have moved many in the line of least resistance too willingly.

Teaching is one of the prerogatives of the physician. We are to teach the youth individually, whenever possible, and we are to help educate the public collectively. Taking normal physiology and mentality as a basis, we should emphasize the fact that the marriage relation is not an obligatory function, except in married life, and we should minimize the factors that provoke and overstimulate an artificial sexual craving. Youth is entitled to the truth, including as exact a picture as we can draw of the serious nature of gonorrhea and syphilis. It should not be overdrawn; but he should know that the liability of becoming infected is dangerously great. Of the prostitutes examined by order of the Women's Court (New York City) in the course of the years 1924–1927 inclusive, more than half were found venereally diseased. Furthermore, the higher percentages were found

among the first offenders. Not all of these prostitutes were cheap or ordinary women; some were classed as higher up and thought themselves above the reach of the law. It is worth while for youth to know that the struggle for existence will demand sound health as a requisite for success, and that he cannot afford to run the risk of the serious long-lasting handicap which a venereal disease is in many a case.

The public is being effectively educated by such agencies as the Public Health Service and the American Social Hygiene Association. We should cooperate with them actively, as we did for example in the campaigns against tuberculosis and typhoid fever.

Law enforcement plays only a small part in prevention. Aside from setting up sanitary codes, and giving departments of health authority to examine convicted prostitutes and to quarantine them if found infected, and aside from restricting the marriage of the venereally diseased and the otherwise unfit, laws are effective in making it difficult for commercialized prostitution to prosper, as it surely would, at the expense of public health. These provisions might well be broadened to include the man caught with the prostitute whenever she is arrested. It would operate in two constructive ways; if he were found diseased, the health department would have a chance to follow up his treatment, using hospital care for the first few days if necessary; and the average young man, knowing that to the risk of infection had been added that of an arrest and a physical examination, might be doubly inhibited from "taking a chance."

CHAPTER XIX

INDUSTRIAL DISEASE

C. H. WATSON, M.D.

INDUSTRY has occupied itself seriously for only the last fifty years with the subject of disease attributable to materials and processes used and the working conditions in industrial plants. The gross poisons, such as lead, arsenic, nitroglycerin, phosphorus; infection, anthrax, and various skin diseases have long been known and measures taken for their control; but the more subtle causative factors such as benzol, antimony, cadmium, tetra-ethyl lead, and some of the volatile esters, have focused attention on the many possibilities to be found wherever less commonly known substances and processes are used.

Authorities, medical as well as non-medical, recognize that there may be many disease factors in industry about which we know but little. Industrial medical departments should be on the alert for factors in the processes and substances used which may account for certain of the obscure diseases met with and to which it is impossible to assign a definite cause. It should be brought to the attention of the practising physician that many times disease-producing factors in industry are not active enough to cause sufficient clinical signs to attract the attention of either the employee or the plant physician. In this way the diagnostic opportunity may be lost and time wasted without remedial and preventive measures being instituted.

The larger communities are becoming filled with an increasing number of manufacturing plants producing all kinds of products and rendering all kinds of services. The medical profession should be in a position to inform itself

along the lines of simultaneous development of accompanying industrial occupational hazards. The medical school, of course, should play its part in providing the student with the most recent information from industrial sources. Industry should be, or can be compelled to be, cooperative in placing at the disposal of the profession facts of this sort.

The literature on disease in industry is already voluminous, yet, owing to the widely scattered character of medical endeavor in industry, it is, with few exceptions, poorly correlated and there is much duplication of effort.

Diseases of occupation may be classified according to causes somewhat in the order of their historical recognition.

1. The dusty trades, producing both organic and inorganic dust.
2. Metallic poisons.
3. Organic poisons.
4. Physical causes: heat, cold, repeated trauma, roentgen ray, radium, electricity, air pressure, humidity.
5. Bacterial causes.
6. Conditions due to faulty ventilation.
7. Conditions due to unusual use and stimulation of the organs of special sense.
8. Conditions due to faulty or unnatural exercise of body functions.
9. Conditions due to parasites.
10. Conditions caused by behaviorism phenomena.

This classification covers a wide range of diseases and their compilation is quite without reference to the compensation question. Compensation boards throughout the country, as a result of experience with cases of all kinds, particularly in the more congested manufacturing areas of the East, have reached the conclusion that there are many compensatory forms of disease directly traceable to industry. Such reasoning, if carried to the extreme, may lead to gross injustice

to certain industries. When the refinements of diagnostic routine are used in investigating the ultimate causes in the obscure forms of occupational disease, the fact should always be taken into consideration that the eight hour day makes possible an available sixteen hours during which time certain other causative or predisposing factors may have an opportunity of affecting an individual. This is brought to the attention of the reader because of the fact that oftentimes familiar commonplace features are liable to be passed over in the course of an investigation and the more dramatic and prominent facts unduly emphasized. It should be borne in mind by those concerned with compensation law legislation that there must be established a direct causal relationship between the substance, process, and working conditions and the type of pathology characteristic of the particular disease.

Organization. Specifically, there is no such thing as industrial medicine. By industrial medicine is meant nothing more or less than good medicine and surgery as applied to industry. To meet the medical requirements in industry the problem may be viewed from two standpoints: (*a*) The small industry with too limited a personnel to justify the industry individually attempting medical work. (*b*) The large industry with a personnel so extensive as to justify the industry in going to any extreme it chooses in medical supervision.

There is no particular problem, with respect to the second classification, except that of policy questions and the keeping of the endeavor within the bounds of proper economics.

In regard to the first group the solution may be analyzed as follows: (1) very small industries (personnel 100 or under). (2) Medium sized industry (personnel 100 to 500). (3) Relatively large industry (personnel 500 to 2000).

The solution of the medical problem in the first sub-group, that of the very small industry, may be accomplished through the utilization of a part time nurse.

The solution of the medical problem in the second sub-group, the medium sized industry, may be accomplished through the utilization of a part time physician and a part time nurse.

The solution of the medical problem in the third sub-group, the relatively large industry, may be accomplished through the utilization of a full time nurse and a part time physician. In any industry, whether the nurse is on part time or full time, there should always be supervision by a physician. In the small industry such service may be accomplished through a cooperative effort on the part of several small industries, relatively adjacent to one another, pooling their needs. It is possible under such an arrangement to attract adequate medical and nursing talent on respective part time bases, adjusted to the requirements of the several industries concerned. The same solution likewise is quite possible in sub-group two, the medium-sized industry where the employee groups approach the maximum numerically; the number of associate industries under such a plan would necessarily be more limited. In the industry with a personnel of 1000 and over, part, at least, of the medical staff should be full time.

The large industry employing from 2500 to 25,000 persons has a real organization problem. The larger the industrial unit, the more necessary that this function should coordinate with the other operating departments.

The physician and nurse in an industry should be at least the equal, and in certain essentials the superior, of the same general neighborhood professional talent. Such services will be found to be relatively costly and the management should plan their organization so that it will be possible to capitalize as completely as possible on the professional training of both doctor and nurse. Furthermore, as an economic as well as an educational feature, these should be relieved as far as

possible of clerical and record-taking commitments. If the organization is of sufficient size, a clerical medical department management may be introduced with good results. Such management, after experience and consultation with other industries, could readily organize so that medical and surgical cases, questions and decisions of a professional nature would be routed to the proper medical people for professional care or decision; much of the recording and sending of reports being done by a non-professional clerical group.

Medicine in industry finds itself tied very closely to the lines of industrial organization and there must always be brought to the minds of those concerned in medical endeavor, the fact that primarily the various industries with which they are concerned have definite obligations with respect to the manufacture and delivery of either a product or service to be sold to the public; that this feature is primary and that accessory lines of endeavor must always be a secondary consideration.

Industry quite generally has become aware that the human portion of its plant is more valuable than its machinery, that it should be appraised and selected, and after employment means provided so that this human element may continue to function as healthy, contented, loyal producers.

Phases of Medical Work in Industry. Medical work in industry naturally falls under the following headings in the order of development:

(1) First aid treatment in accidents.
(2) First aid treatment and investigation of injury and industrial disease.
(3) Pre-employment examination.
(4) Periodic employee examinations.

(5) First aid treatment in sickness.
(6) Diagnostic service for employees.
(7) Advisory service on medical and surgical problems.
(8) Advisory service on hospitalization, sanatoria, nursing, and convalescence.
(9) Health education publicity.

First Aid. Under the heading of first aid there arises the question of first aid training for lay people. In the plant with close segregation of the employees, where there is direct opportunity for centralized control of the various accidents occurring throughout the plant, the ideal method for the care of the accident is to have the patient transported to or, if able, to come at once to the plant dispensary and there subject himself to the proper standard practice that has arisen out of the best surgical experience. In certain industries continuing care throughout the period of disability may be undertaken, and is not only a proper procedure, but, due to the stringency of certain state compensation laws, may seem to be highly desirable. The hazard involved in handling accident cases under the above mentioned plan will always be present. Nevertheless, with the proper application of modern methods by competent people, bad results will be of less frequent occurrence than when handled on the outside by the average medical practitioner or the average man doing general surgery.

In the course of time there have grown up methods of technic in the care and treatment of accident cases which have become incorporated in standard works on the modern practice of surgery, and in this way industrial surgery has made many real contributions.

Surgical Supervision. The application of first-aid measures and early or continuing treatment as applied in a plant medical department should be always under the supervision of a

medical man, for the nurse alone does not meet the requirements of the casualties to be met nor does she meet the requirements of the law. While the number of cases and dressings may or may not be beyond his ability to handle personally, nevertheless, the plant physician should be held responsible, and should maintain strict adherence on the part of his assistants to what he deems the best that is known in standard practice. According to this plan there must be efficiency and friendly cooperation with the supervisory forces throughout the industry in order that the employee with the trivial injury will be obliged to come to the medical department immediately for the application of treatment. Corporations where this is done, such as Bethlehem Steel, Carnegie Steel, American Rolling Mill, International Harvester Company, Eastman Kodak Company, General Electric, Westinghouse Company, and others, have found that the number of infections following either trivial or major accidents is practically nil. In the corporations just mentioned, and in many others throughout the country, this has become a fixed and definite policy. Nevertheless, it has its limits in those institutions which have grown to such size and distribution that the distance from the dispensary, dressing station, or hospital is so great that temporizing and local means must often be instituted in accident and certain sickness situations. Example of these latter groups are light and power companies, transportation companies, telephone and telegraph companies, etc. This brings up the question of care at hands other than those of professionally trained people.

First Aid Training in Industry. In certain industries, such as mining, power and transportaton, telephone and telegraph, where the hazards exist out in the field of operations and many times distinctly removed from medical facilities, it

has seemed wise to train members of the force in first aid and to equip them with suitable supplies to enable them to cope with the results of accidents. In the mining industries, in the steel and iron trades, and in the telephone organization, this has been carried to a high degree of excellence. The main features of modern first aid endeavor must be narrowed down to essential fundamentals. The primary object of first aid should be to supplant in any way medical service and advice. First aid is for the purpose of saving life and so to attend to the injured person that the injury may not be further complicated, the injured person made comfortable, and, if necessary, transported without hazard. The end result of covering these requirements is that when medical attendance becomes available the first aid hazards will have been cared for according to the best of modern standard practice. Thus it is, that first aid training narrows itself down to four main headings: (1) Starting breathing; (2) Stopping bleeding; (3) Measures to insure comfort and safety; (4) What not to do.

First Aid Equipment. The equipment for first aid varies somewhat according to the requirements of several industries as well as to the personal preferences of the physicians in charge of the work. There are, however, certain cardinal features which must be included in all first aid outfits.

1. There should be, as a part of all first aid kits, a manual of instruction telling how, where, and when to use the several articles. Of special importance are definite understandable written instructions on artificial respiration to supplement the knowledge of those who have already received training. Throughout the majority of industries the Schaefer prone pressure method is preferred.

2. All first aid kits should be provided with definite instructions as to how to make and apply a satisfactory tourniquet.

3. There should be sterile surgical dressings for small as well as for large wounds, these dressings to be packed in such a fashion as to allow the person with unclean hands to apply them without any contamination. Naturally, there should be more of the smaller dressings than of those of larger sizes.

4. All first aid kits should be provided with a germicide for the sterilization of wounds. The selection of a germicide depends on the experience and occasionally on the whims of the plant surgeon plus, to no small extent, the endeavors of the representatives of the several drug and chemical houses manufacturing germicides. It is the proper policy in many of the larger industries to use only preparations that have been endorsed by the Council on Pharmacy and Chemistry of the American Medical Association This insures standard quality and supplies that are generally available throughout the country. For this reason tincture of iodine (3 per cent, occasionally 7 per cent) in proper containers that prevent evaporation, is still in use in most of the larger industries. Mercurochrome, acriflavine, hexylresorcinol, and others have their respective advocates, many times based on the results of a broad experience; all of which demonstrates the fact that it probably makes little difference what is used so long as a wound has a chance to wash itself out with an adequate amount of bleeding.

5. All first aid kits should be supplied with either compact collapsible splints or contain specific directions as to how to prepare a padded emergency device for the retention of broken limbs. We are coming to the time when the rolled or pleated bandage will be supplanted by the triangular bandage. The outfits provided in many industries are more and more being supplied with this simple, yet extremely adaptable, form of dressing.

6. There is a growing prejudice against medication by mouth at the hands of lay people. The bottle of alcoholic

stimulant for the shocked individual, whether it takes the form of spiritus frumenti or simply aromatic ammonia, is not considered available in standard practice. In the shocked or fainting accident case it will be found that about as good results may be obtained from the use of alcoholic ammonia preparations suitable for inhalation. The commercial ammonia inhalant of the several manufacturers meets this need.

7. The problem of burns is met by applying a dressing that makes for the comfort of the injured person, yet is of such a character that it can be easily removed with a minimum of pain, leaving the burned surface in such a condition that the physician called, may use the method of treatment which in his experience has proved to be the best. A simple grease dressing, such as sterile vaseline, or a saturated bicarbonate of sodium solution, meets this requirement.

These essential articles of first aid equipment represent an extremely simple, inexpensive, and compact outfit. The prime factor, to be emphasized to the enthusiastic lay exponents of first aid training, should be that the program is first, last, and always purely first aid and in no wise constitutes treatment. The treatment of the injured person, as of the sick person, should always be considered the responsibility of the physician who assumes charge.

The Physical Examination. The physical examination of employees groups itself under the following headings:

(*a*) Physical examination of prospective employees.

(*b*) Periodic examination of employees.

(*c*) Examination of employees after absence due to sickness, before returning to work.

(*d*) Examination of employees after absence due to accident, before returning to work.

(*e*) Examination of employees on special request of superiors because of management problems.

Industry is endeavoring to know the physical condition of its human plant, whether it pays sickness or accident disability benefits or not, and is entitled to know generalities about the personnel, at the time of employment or at any time afterward, if certain questions arise. It should be understood that physical findings should not be used as the sole determinant of initial employment or of continued employment.

Pre-employment Examination. Labor's question as to the justification of pre-employment physical examination is a proper one. Primarily, examination of the prospective employee should not be to determine whether or not he shall work, but should be for the purpose of determining his physical condition at the time he undertakes work and whether or not he may be a menace to himself, to others, or to property or service. As to the responsibility for the physically impaired who are rejected for employment, the community should know the problem and be in a position to take proper measures to meet its share of the burden. This does not mean that knowledge concerning physically sub-standard people should be broadcast, but it does mean that those who are rejected should know, or their medical advisers should know, the physical reasons for their rejections. Here is a real responsibility for industry and the opportunity to make a constructive public health contribution. An industrial-relations opportunity likewise awaits in the chance afforded the examining physician to give proper advice as to health habits based on the examination findings. This may automatically bring a certain percentage of sub-standard individuals up to or approaching normalcy.

Job Requirements. Supplementary to any job analysis are the requirements of the several jobs. Such items may be correlated with the ascertained physical facts and expressed in terms of job requirements: first, mental; second, physical.

The mental qualifications may be analyzed under such headings as imagination, attention, apperception, association, resourcefulness; the physical requirements under the headings of muscular strain or effort, standing, sitting, degree of activity, precision movements, oft repeated movements, eye strain, ear strain, dexterity of the hands and digits.

Physical examination requirements for employment, of course, vary according to the industry and may be either simple or exhaustive. The types of records should, in a measure, conform with the record system of the other departments of the industry. The simple fact that a medical office has been injected into the industry does not mean that all the appurtenances thereof should be unique in character.

The type of instructions as to the method and scope of the examination depend likewise on the industry involved. It should be possible, however, to standardize throughout any industry instructions to those doing the examining, to the end that a uniform procedure would be in vogue in that particular industry, wherever it may be located.

Employment. Employment classification under various physical standards is obviously a difficult problem, nevertheless, in a number of industries, ways have been found of determining the physical type of individual who can perform certain tasks. In other words, one may visualize the type of individual who works as a molder in a steel mill, or who runs an open hearth furnace, as compared with the one who stands at a lathe or a punch press and carries out a rather routinary task.

Individuals possessing physical handicaps may be grouped under two headings: (*a*) Those with minor impairments; (*b*) Those with major impairments.

In either event both major and minor impairments may be correctable or non-correctable. If they are correctable their degree of minority should determine the amount of

persistence to be expended by the management in endeavoring to bring about their correction. Correctable major impairments, however, should constitute one of the conditional elements of employment. Non-correctable major or minor impairments call for an increased periodicity in any physical examination schedule particularly among those with major impairments. A case of diabetes or Bright's disease, or a healed duodenal ulcer, a nephrectomy case, an old poliomyelitis case, should be looked over medically, at more frequent intervals than where some minor impairment exists.

Periodic Examination. This is a physical examination which takes place after an individual has been employed, and repeated at certain intervals during the course of his employment. One of the objections to the periodic physical examination has been brought about through the overzealousness of the medical profession. The feasible periodic physical examination in industry can not be 100 per cent exhaustive. The industry is not a hospital or a doctor's office. It is an institution for manufacturing a product or providing a service to be sold to the public for profit. Naturally, certain economies must be practised just as truly in the medical department as in the other phases of the business. The more prominent anatomical and physiological factors which constitute the life processes and activities of an individual should be carefully scrutinized and investigated as conditions found may warrant. We have very little justification for the pre-employment examination if we are not going to provide for periodic examinations after employment. The pre-employment examination should serve in addition to its other features, as an indicator of the extent and character of the periodic examination necessary.

An individual's health and an individual's life, in the last analysis, belong to himself. Here, as elsewhere, people

should be considered as free agents and the periodic examination should be on a voluntary basis. If its value can be proven to the industry, the industry should be willing to spend money and time to demonstrate its value to the employee, and while the examination should be voluntary those accepting it should in time constitute a substantial percentage of the force. The compulsory periodic physical examination of the employee in the majority of our American communities would give rise to more unfavorable comment than if it were sold voluntarily. There are, however, in various parts of this country and other countries, individuals of such a grade of intelligence and education that unless physical examination were compulsory there would be no possible way of achieving it.

Examination of Employees after Illness. Examination of employees returning after illness has a threefold advantage: (1) to the employee in that it is another opportunity to determine whether or not return to work would in any way jeopardize his physical condition or aggravate the factors which were responsible for the recent illness; (2) the industry can determine whether the expenditures already made to the individual, during the period of illness, were justified and can also determine whether the employee is in condition to return to his former occupation or to some other form of activity; (3) an evaluation of the benefits which might accrue to both employer and employee from a longer convalescent period under the direction of the medical department of the industry itself. In other words, it constitutes an appraisal of the human machine that has been broken down and which has been repaired and now may or may not be able to carry on its former occupation.

Examination of Employees after Accident. The examination of employees after accidents is an important phase of medical department endeavor for two reasons, in that the industry

is entitled to know the facts with reference to the final anatomical and functional results of the accident and the subsequent rehabilitation as well as pathological, anatomical, and functional conditions which might have caused said accident or which in the future would predispose to accident. These conditions are: (*a*) those pertaining to the compensation elements involved; (*b*) those pertaining to the question as to whether or not the individual should assume his former or some other occupation.

In the event that the injury has not been cared for under the auspices of the plant medical organization, the result of the survey may show certain correctable factors which may be further instituted to the very great advantage of the injured employee and, in a secondary measure, of the industry itself.

Throughout any industry occasions may arise when supervisory officials exercising what should be a normal function discern conditions among their force which indicate situations involving such factors as impaired or faulty production, habitual absenteeism, discontent, lack of cooperation, and insubordination. The wise executive may see, other things being equal, that behind the phenomena exhibited in the course of such phases of behaviorism may exist questionable physical and mental conditions. As a result of such examinations and suitable advice, some serious and temperamental outbreaks, in the form of pathological behaviorism which may operate disastrously to the individual or to his associates may be prevented.

Diagnostic Service. The diagnostic service for employees is a part of the natural growth of medical endeavor in industry. It has been found that individuals employed in any large industry may have suffered at various times from conditions which are more or less obscure. Physicians outside of the industry having charge of such employees would

often welcome diagnostic aid. The average wage earner of today, even though wages may be on a markedly higher scale, under the burden of prolonged illness may find himself financially embarrassed. When the question of costly diagnostic measures is broached he may find himself unable to assume further expenditures except at a very great sacrifice. The conscientious medical attendant who may know the situation, appreciates the difficulties involved and hesitates to insist on still further financially involving his patient or the family. The result is that oftentimes serious medical and surgical questions go unanswered or without anything beyond the simplest endeavors to obtain a correct diagnosis. In those industries where either the industry is carrying the cost of sickness benefits or where the industry is participating with the employee body in a Benefit Plan, it is quite right and proper that they should spend money as a form of administration, in the effort to find out the exact answer to the condition for which they are expending the company's or benefit organization's funds. For that reason, in certain industries, diagnostic machinery is set up at various points where employees can go at the request of their physician or at the request of the management, and obtain diagnostic service of a proper kind, the result of such inquiry to be placed at the disposal of the physician in charge of the case. The results of such diagnostic service present several distinct and proper evaluations: (1) to the employee; (2) to the employee's physician; (3) to the industry itself.

General Medical Advisory Service. A still further outgrowth of medical work in industry is that of an advisory service. Employees choose their medical attendants with rather less care and forethought than they choose the mechanic at the garage who is to care for their automobile. The physician is selected rather by hearsay, somewhat

because of appearance, and in the last degree because of what is definitely known concerning his professional skill. It has been found in the course of time that those concerned medically in industry are in a position to offer advice as to medical service, to provide counsel and solace in the event of medical or surgical catastrophe, and make clear to the individual the proper lines of procedure for obtaining specialists, nursing service, pathological facilities, drug supplies, etc. Employees are constantly harrassed as the result of sickness problems in their own immediate family and in other persons for whom they may be more or less responsible. Such problems are extremely disconcerting and interfere with efficiency. The giving of advice along the above lines is a justifiable function of a plant medical department.

Very often there arises in the course of major medical and surgical illnesses questions of hospitalization. In a service of this kind it is possible to lend the results of departmental experience, plus the experience of the individual medical people employed, to assist in the proper economical solution of questions of this sort. There are many times when one or more of the several medical or surgical specialties are in question and where certain institutions are more suitably equipped and more adequately situated to handle such problems.

Health Education. In view of the very extensive movement in the world at the present time along the lines of health conservation and health education, medical endeavor in industry is in a peculiarly strategic position. Once the medical department is satisfactorily established and has the confidence of the employee body it can serve as a center from which health education campaigns may radiate. This mission may be directed concretely and with greatest emphasis at the time of the periodic physical examination. Here is the proper and most evident way of individually

calling attention to proper lines of conduct. This work may also be carried on through lectures, posters, systems of simplified health instruction, suitable publicity in relation to the prevention or cure of venereal disease, cancer, and degenerative diseases of old age, as well as social and moral problems.

CHAPTER XX

OCCUPATIONAL DISEASES

ALICE HAMILTON, M.D.

THE prevention of occupational diseases is primarily the function of the industrial management, secondarily the function of the plant physician. In an ideal industrial establishment the two work together; the physician is conversant with all the process of manufacture and is therefore able to link up the disturbances of health he observes among the workers with the processes in which they are engaged; he cooperates with the management in the effort to introduce safeguards against dangerous dusts, fumes, and gases, and in the education of the workers; he keeps close watch of the newly employed in order to detect the first signs of disease. He is, however, under present conditions, in a subordinate position, and therefore the prime responsibility in the prevention of occupational disease lies with the management, which has the last word in regard to methods of work, substances used, and equipment for the prevention of disease. For the non-industrial physician, preventive work in the field of occupational diseases is hardly possible. He may lessen the danger of plumbism in a lead worker by advice as to drinking milk and the use of cathartics, but if his patient is forced to breathe lead fumes for eight or ten hours a day, such advice will provide a very frail dam against the threatened flood. The effort of the physician not connected with the plant to protect his patient against industrial disease can rarely go beyond the recommendation to seek other work.

For the works manager and the plant physician, who have the duty of planning protective measures against occupational disease, the first requisite is an understanding of the

nature of the danger which is to be guarded against, and especially of its mode of attack. In the case of poisons, it is necessary to know how they gain entrance to the human body, otherwise the protective measures planned may be quite useless. In the case of non-poisonous dusts, it is necessary to know their chemical nature, especially whether or not they contain free silica, and also their physical nature, coarseness or fineness, whether or not they are in a state of agglomeration or freshly sublimed. On all of these factors depends the devising of an intelligent system of disease prevention.

It will be impossible to do more than discuss briefly the most salient points under the two heads, non-poisonous dusts and poisonous gases, fumes, and dusts. Let us take up the non-poisonous first. Although there is still some controversy over the mode of action of dusts containing free silica, it is admitted by all that such dusts predispose the lungs to tuberculosis in a very special degree. The British and American schools hold that this is due to a toxic property inherent in free silica. The Continental experts tends to believe that the damage from silicious dusts is due to the absence of lime rather than to the presence of free silica.[1] Studies made, especially by the British, have shown that coarse particles do not reach the lungs; it is those particles under 10 microns that do the real damage. The action is slow, tuberculosis developing rarely in less than five years, usually after ten to twenty years' exposure. The workmen most endangered are miners of ore which is embedded in silica-containing rock, such as is found in the mines of the Rand,[2] the copper

[1] Mavrogordato, A. Studies in Experimental Silicosis and Other Pneumokonioses. South African Institute of Medical Research, 1922.

Nicholson, B. S. The dusted lung. *J. Indust. Hyg.*, 5: 220, 1923.

Gardner, L. U., and Dworski, M. Studies on the relation of mineral Dusts to Tuberculosis. *Am. Rev. Tuberc.*, 6: 782, 1922–23.

[2] *Proc. transvaal Mine Medical Officers Assn.*, 2: 1, 1922.

mines of Montana, the zinc mines of western Missouri.[1] Other industries in which there is serious exposure to silica-containing dusts are: sand blasting metal, such as machine parts, automobile bodies, steel railway cars, sanitary ironware, etc., to prepare them for coatings of all kinds, work which results in thick clouds of finely divided silicious sand from which it is very difficult to protect the workers; granite cutting with an air hammer, especially the making of granite tombstones indoors; the blasting of tunnels, especially through the granite rock of Manhattan Island; the mixing and grinding of enamels and pottery glazes; the use of sandstone grinding wheels, and work with certain artificial stones containing free silica.

To prevent the development of silicosis and tuberculosis from dangerous dusts it is essential to see to it that no man with lungs already damaged be employed for such work. This means that an examination of the lungs, including a roentgenogram must be made before employment, and it is highly desirable that every six months thereafter this examination be repeated and the man be suspended from work if the picture shows anything suspicious. It is important to remember that only the finest particles of dust are dangerous, therefore the man may be gravely endangered even when the air of the shop looks fairly clear. Since it is almost impossible to keep the air really clear, the worker in silica dust should be protected, not by an ordinary respirator for if it is an efficient filter it will impede breathing too much, but by a respirator with positive air pressure, several makes of which are now on the market.

There is no such conclusive evidence with regard to the damage done by dusts that are free from silica, but there is much suggestive evidence pointing to a high bronchitis and

[1] Harrington, D. Summary of Investigations of Dust and Ventilation in Metal Mines. U. S. Bureau of Mines Rep. No. 2374, July, 1922.

pneumonia rate among workers exposed to the dust of coal mines, of manganese ore, of asbestos, and to certain vegetable dusts.[1] Nevertheless it is not necessary to take as great precautions against these dusts as against silica dust.

The freshly sublimed oxides of heavy metals have a very special effect which is not, strictly speaking, toxic. We have long been familiar with this fact in connection with brass fumes, for brass founders' ague has been recognized and described for almost a century. Recently, however, it has been shown that the same symptoms may be brought about by other metal fumes, such as magnesium, copper, and cobalt.[2] The explanation is that the oxides formed as the fumes from heated metal cool are in finely divided form not yet agglomerated, and when inhaled they reach the alveoli of the lungs easily, and there, by virtue of their hygroscopic property, they damage the lining cells, causing extensive desquamation. It is the resorption of these dead cells that brings about the chill, fever, and prostration characteristic of metal fume poisoning.[3]

The toxic compounds used in industry enter the body through the inspired air, through the skin, or by direct ingestion through contaminated food or tobacco, or through some implement of work such as a tiny paint brush. Of these three modes of entrance the first is responsible for an over-

[1] Dublin, L. I. Mortality of coal miners from influenza-pneumonia. *J. Indust. Hyg.*, 1: 483, 1919.

Collis, E. L. The general and occupational prevalence of bronchitis. *J. Indust., Hyg.*, 5: 264, 1923.

[2] Koelsch, F. Metal-fume fever. *J. Indust. Hyg.*, 5: 87, 1923–24.

Drinker, K. R. and P. Metal-fume fever. *J. Indust. Hyg.*, 10: 56, 1928.

[3] Lehmann, K. B. Das Giess oder Zinkfieber. *Arch. f. Hyg.*, 72: 358, 1910.

Drinker, P. Certain aspects of the problem of zinc toxicity. *J. Indust. Hyg.*, 4: 178, 1922.

whelming majority of the cases of industrial poisoning, the last for a very small minority. Poisonous gases, dusts, and fumes, the last being really very fine suspensions of dust, constitute the chief danger in the poisonous trades. Such poisons may produce local damage on the upper respiratory tract, as do for instance the caustic alkalies, hydrofluoric acid, the chromates, and arsenic trioxide, the last two of which are rarely responsible for any damage more serious than ulcers in nose and throat. The local action may, however, extend to the lungs as is sometimes the case with sulphur dioxide, hydrochloric acid, and almost always with nitric acid and the nitrous oxides. There is a very large class of non-irritating gases which pass directly to the lungs and are absorbed, and this class includes carbon monoxide, hydrogen arsenide, hydrogen sulphide, the petroleum distillates, the chlor derivatives of the petroleum series, methyl alcohol, the coal tar distillates, benzene and toluene, turpentine and carbon disulphide.

It is generally assumed that poisoning from the heavy metals such as lead, mercury, or manganese, is due to the uncleanly habits of workmen who handle their food with unwashed hands, but practical experience on an enormous scale as well as countless laboratory experiments have proved that it is the contamination of the air with dust and fumes that causes such poisoning.[1] It is the air which the workman breathes fourteen times a minute that poisons him, not the food that he handles at lunch time. Slow, mild, chronic poisoning may be caused by unwashed hands, but

[1] des Planches, T. Lead Diseases. Trans. by Samuel Dana, Lowell, 1850.

Aub, J. C., Fairhall, L. T., Minot, A. S., and Resnikoff, P. Lead Studies. Medicine Monographs, vol. 7, Balt., Williams & Wilkins, 1926.

Edsall, D. L., Wilbur, F. P., and Drinker, C. K. The occurrence, cause and prevention of chronic manganese poisoning. *J. Indust. Hyg.*, 1: 183, 1919–1920.

rapid, severe, acute poisoning can always be traced to contaminated air.[1]

The poison thus breathed in may, if in very finely divided form, reach the lungs and be directly absorbed into the blood stream, thus rapidly invading the body. The coarser particles are swallowed with the saliva and are absorbed more slowly and incompletely, for the defensive powers of the intestinal tract and the liver are effective enough to dispose of a varying proportion of the poison that enters through this portal.

The prevention of poisoning through contaminated air is a problem for the plant engineer. It is for him to provide against the escape of gases which are accidentally produced under unforeseen conditions, such as hydrogen arsenide, formed when sulphuric or hydrochloric acid is brought in contact with arsenic-contaminated lead or zinc or antimony, or hydrogen sulphide produced by the decay of animal matter in glue, soap, and gelatin manufacture, and in tanneries. It is for the engineer to prevent the escape into the air of nitrogen oxide fumes in making celluloid and lacquers, of poisonous dusts such as lead ore or the fumes from lead smelting, the dust of lead oxides in storage battery manufacture and in making red lead paint, the dust of white lead, the fumes of mercury in metallurgy, in making thermometers,

[1] There is, however, an occupation in which direct ingestion plays an important part. This is the work of the commercial artist who retouches with white paint photographs for reproduction in catalogues, etc. He often uses white lead paint and points his little paint brush by putting it in his mouth. The same procedure is believed to have played a part in the recent cases of radium poisoning which developed in women using radioactive material to make luminous figures on watch dials and pointing their brushes in their mouths. Castle, W. B., Drinker, K. R., and C. K. Necrosis of the jaw in workers employed in applying a luminous paint containing radium. *J. Indust. Hyg.*, 7: 371, 1925.

or in carroting fur for felt. There are certain processes, especially those connected with repairing furnaces and cleaning flues, in which the exposure to poison is inevitable and special protection must be provided in the form of gas masks or respirators with positive air pressure. The Bureau of Mines has done much experimental work in this field and is prepared to give advice with regard to the masks to be used against specific poisons. Such protection must be regarded only as an emergency measure, for no workman should be expected to work regularly hour after hour in a gas mask.

Protection against gassing with carbon monoxide should include the provision of an inhalator which delivers a mixture of oxygen 95 per cent with carbon dioxide 5 per cent. The experiments of Yandell Henderson and his colleagues[1] which have been confirmed by others show that victims of asphyxiating gases require not only oxygen but carbon dioxide for its stimulating action on the respiratory center.[2]

A fairly important number of poisons produce their effect upon the skin or make their entrance into the body through the skin. To this class belong the amido and nitro derivatives of the benzene ring, the nitrobenzenes, nitrotoluenes, anilines, toluidines, diamines, chlor-benzenes, etc. Inhalation of fumes and dust may also cause poisoning, but industrial experience shows that the severest forms are caused by spilling liquid over the clothing or letting dust fall on the

[1] Henderson, Y., and Haggard, H. W. The treatment of carbon monoxide asphyxia. *J. A. M. A.*, 79: 1137, 1922.

[2] The Commission of the American Gas Association composed of Doctors W. B. Cannon, Lawrence J. Henderson, Cecil K. Drinker, Francis W. Peabody, and David L. Edsall of Harvard, and Yandell Henderson and H. W. Haggard of Yale, have examined and accepted three appliances for the administration of oxygen-carbon dioxide mixture. These are: the H-H Inhalator, the Industro Oxygenator Universal Model, and the Model C Atmos Inhalator.

sweating skin.[1] Some of these poisons have a very slightly irritative effect upon the skin as they pass through; others, especially the nitro derivatives, cause severe dermatitis as well as systemic poisoning. Other poisons whose effect is chiefly on the skin are the chromates, white arsenic, and Paris green.

The protection of the workers from this class of poisons must follow quite different lines. Strict cleanliness of the body is by far the most important point, and this involves the prevention of dust in the air and the cleanliness of apparatus and all surfaces, especially work benches. It involves also the provision of clean working clothes, sometimes including socks, underwear, and caps, and of shower-baths, soap, and towels.

Cutting oils have given rise to very troublesome epidemics of boils and furuncles which have been traced to contamination of the oil by pus-forming organisms.[2] It has been shown that so-called paraffin oil forms the best culture medium for these organisms, and this oil is generally avoided now.[3] By proper selection of the cutting oil, by keeping it as clean as possible, and by providing warm water, soap, and towels, oil folliculitis can be entirely prevented.

Certain trade eczemas are supposedly traced to dyes or inks or furniture polish or the use of cleaning fluids, such as benzene, naphtha, or alcohols. The real cause of such eczema is apparently the removal of fat from the skin either by very rough cleaning methods with abrasive soap and stiff brushes to get rid of ink or dye, or through the fat-solvent action of the alcohols, benzene, and naphtha. Prevention consists in

[1] Hamilton, A. U. S. Bureau Labor Statistics, Bull. No. 280.

[2] Shie, M. Wound infection among lathe workers. *J. A. M. A.*, 69: 1927, 1917.

[3] Bull. of Research Staff of E. F. Houghton & Co., 1920. Abstr. in *J. Indust. Hyg.*, 2: 215, 1920–21.

using bland soap mixtures without scrubbing, and in restoring the fat by anointing the hands with lanolin or lard or castor oil.

It is recognized in industry that a physical examination made by a competent physician of all men and women applying for work is absolutely necessary in an establishment where dangerous dusts or industrial poisons are to be encountered. The physician who makes this examination should divide the applicants into three classes, of which the first will contain individuals fitted to undertake all jobs, including the most dangerous; the second class will contain those with some physical handicap who must do only safe work, and the third those accepted for work only in departments free from dust or poisons. Even this will not weed out the oversusceptible individuals; only experience and close watching can be relied upon to do that, for, as is true of the infectious diseases, the victim of lead or mercurial or nitrous fume poisoning may be a physically perfect specimen whose idiosyncrasy cannot be detected in advance. It is only by keeping close watch during the first months of employment that the physician can discover the oversusceptibles and by shifting them promptly to other work prevent severe poisoning.

For the prevention of tuberculosis from silicious dusts and for the prevention of occupational poisoning, youthful workers must be excluded, for the susceptibility to tuberculosis is greater in early life, and youthful workers have been shown to be more likely to succumb to lead poisoning and to the action of the coal tar poisons, of which benzol is the most important, than are the mature.

The question of oversusceptibility to industrial poisons on the part of women is still controversial. We have accurate data in connection with only two poisons, lead and benzol. Lead, by its well-known action on the generative organs, is

productive of sterility in the mother or a lessened viability in her offspring, and this effect may appear even though she is not exposed to lead after her marriage.[1] For this reason all the important industrial countries except our own forbid the employment of women in dangerous lead work. Benzol gives rise to an aplastic anemia with purpura hemorrhagica,[2] causing excessive menstruation and in pregnant women abortion. With regard to other poisons we have no definite information as to the part played by sex in susceptibility. Colored people are less susceptible to poisons which irritate the skin but apparently more susceptible to lead and more likely to suffer from that form of plumbiam which attacks the central nervous system, lead encephalopathy.[3] The physician should always advise against the employment of negroes in dangerous lead work.

Although no measures of personal hygiene will save a worker from occupational disease if the conditions of work are bad, yet there are certain rules of hygiene which are decidely useful. Both observation and experiment have shown that the presence of milk in the stomach inhibits to a decided degree the absorption of lead.[4] British and German employers have long had the habit of providing milk for lead workers the first thing in the morning or in the middle of the morning and the afternoon. Workers in mercury should be urged to have their clothing washed frequently, for the mercury that is absorbed by the overalls or cap or shoes will volatilize all the time and set up a slow poisoning.

[1] Legge, T. M. Industrial lead poisoning. *J. Hygiene*, 1: 96, 1901.
Oliver, T. Lead poisoning and the race. *Brit. M. J.*, 1: 1096, 1911.

[2] Selling, L. *Johns Hopkins Hosp. Bull.*, 221: 33, 1910.

[3] Hamilton, A. Industrial Poisons in the United States. N. Y., Macmillan, 1925, pp. 6–8.

[4] Carlson, A. J., and Woelfel, A. The solubility of white lead in human gastric juice and its bearing on the hygiene of the lead industries. *J. Pharmacol. & Exper. Therap.*, 5: 549, 1913–14

When all that is possible has been done to control the escape of poisonous fumes or gases and yet danger remains, there is one measure which the physician can still recommend, and that is that the exposure be shortened. The work may have to go continuously but the men can be shifted every few hours, and in this way the dose which each receives may be kept down to a reasonable level.

To summarize, the prevention of occupational disease depends upon control of the conditions under which the work is done. This control must be based upon an intelligent understanding of the mode of action of the given dust or poison and its mode of entrance into the body. The rule should be to prevent the escape of the dangerous substance if possible. If it is not possible to prevent contamination of the air or bodily contact with the poison then the individual worker must be given a supply of pure air by artificial means and ample facilities for bodily cleanliness after his work is over. If none of these measures is feasible the only thing that remains is to shorten the hours of exposure to the danger in question.

CHAPTER XXI

SELF-MEDICATION, ILLEGAL PRACTICE, AND NARCOTIC DRUG ADDICTION

FREDERIC E. SONDERN, M.D.

ATTEMPTS to remedy indisposition or illness in a manner other than by the advice of a legally qualified physician are universal. Practically everyone undertakes self-cure at one time or another for what is considered a trivial ailment.

The sulphur and molasses spring medicine of our country cousin of a generation ago and the rock and rye for a cold of his city brother of the same period, have been replaced by a series of tablets to be found in every modern home, such as bicarbonate, aspirin, rhinitis, cascara, and what not.

The slight potential danger, if any, of such self-medication, especially in the hands of intelligent persons, is tremendously overshadowed not only by the relatively stupid indiscriminate use of proprietary medicines, but particularly by the incompetent and fortunately illegal medical advice given by persons insufficiently or not at all trained to interpret symptoms of disease.

The menace of this illegal practice of medicine is twofold. Primarily it affects the people as a whole in the failure to recognize communicable disease at the onset, with consequent jeopardy to public health. Secondarily it affects the health and happiness of the individual in the lack of any diagnosis of the symptoms or in error in diagnosis from ignorance or design. While we cannot deny the sane individual the right to be the arbiter of his own destiny in health as in all else, we must prevent any individual from endangering public

health by the nonrecognition of communicable disease. There are but few scientific men who have a high opinion of the discernment and discretion of a large part of the public, for there is too much clairvoyance, Christian lack of science, medical sectarianism, and medicine-chest quackery and too much dilettantism amongst our well clad and well fed, semi-instructed, but uncultured and mentally unbalanced classes.

Public health education, by whatever means achieved, teaches the individual his duty to himself, to his dependents, and to his community, but for the benefit of public health as a whole, the duty of the Public Health Administration to prevent communicable disease is much more important. That communicable disease can be prevented, also that the people have established an Administration vested with all necessary legal power for this purpose are established facts. If an individual can sucessfully sue his community, as has recently been the case, because he contracted typhoid fever from a contaminated city water supply, it does not seem impossible that the time may come when suit may be brought against the community because a child contracted scarlet fever in a public school.

While public health authorities strive in all possible ways to control contagion, they are handicapped by the illegal practitioner who is unable to recognize communicable disease and by the physician who fails to report cases of this kind. However lenient the public may wish to be with the illegal practitioner, be he a sincere healer or a notorious charlatan, public health remains in jeopardy so long as communicable disease remains unrecognized by this means. The object of the legal requirement that a physician shall immediately report every case of communicable disease he meets with is obvious. The reason he does not invariably do so is the fact that the patient and his family may be sub-

jected to what he considers annoyances and hardships, some of which may be necessary for the public good but others he considers unnecessary in every instance. Boards of Health are constantly striving to secure complete enforcement of this law, often with but indifferent sucess. The problem can best be solved by a complete understanding between the officials of the Department and the practising physicians in a series of conferences during which the matter is discussed intimately. In this way objectionable and possibly unnecessary procedures are eliminated, practically complete cooperation can be secured, and more nearly complete returns can be obtained. The results obtained in this way in Cleveland several years ago illustrate this very well.

The extent to which medicine is practised illigally is far greater than most people realize and the amount of money spent for incompetent advice and useless medication is almost beyond belief. One report made thirty years ago has it that the public spent two hundred million dollars in one year for proprietary medicines alone.

While charlatanry antedates legal practice, among the numerous contributing causes to its continuance and popularity which concern the medical profession most are the sins of omission by physicians themselves. The average physician is a very busy man, his time is completely occupied with the care of sick people, and he is apt to have relatively little patience with people he thinks are simply concerned about their health or those whom he considers neurasthenics or psychasthenics. The average patron of illegal practice is not necessarily an ignorant person, and in more instances than should be he is tempted to seek such aid by an unsatisfactory or unsympathetic attitude toward his real or imaginary ailment by his legally qualified physician. A smaller but more important group consists of persons suffering from malignant or other often incurable disease. In some of these

cases it is the proposal of what the patient considers mutilating surgery, or some rather indefinitely prolonged regimen with obviously guarded prognosis at best, or a hopeless prognosis, which brings the patient to the charlatan.

The qualified physician is modest in exploiting his own ability and conservative in picturing the results he hopes to obtain. The irregular practitioner's greatest appeal to even intelligent persons is his statement, "I will cure you," followed by an outline and cost of the proposed procedure.

Why is one physician more successful in life than another? In some instances he has greater ability in the science of medicine, but much more frequently his exceptional ability lies in the art of medicine, in his ability to sell himself to the public, and this does not necessarily mean that he employs ways and means which are open to criticism. The sucessful physician is not the one from whom irregular medicine recruits its victims.

Addiction to the use of narcotic drugs was years ago generally ascribed to the physician's carelessness in unduly prolonging the use of such drugs as specifics or in painful diseases especially in emotional or otherwise unstable human beings. Textbooks on Therapeutics usually cautioned the reader on this point and even went so far as to advise how such therapy should be tapered off when no longer required. Detailed accounts of how to conduct the treatment of peritonitis with opium is a case in point.

There have always been cases of addiction to alcohol in excess, but is the picture of today the same as it was a quarter of a century ago? By no means. Today a large number of people mildly or even grossly intoxicated belong to a different social stratum. The same applies to the narcotic addict. Today the few narcotic addicts who can ascribe their habit to painful disease past or present are tremendously overshadowed by those who have voluntarily acquired

the habit usually from another addict, but certainly not as the result of medical care or fault. As a group they are emotional persons of the middle class with little if any strength of character. While criminals, prostitutes, and persons without stable steady employment form a large percentage of present day addicts, the statement that it is a vice of the socalled underworld only would scarcely seem accurate.

Self-medication. Just as it has become the physician's duty periodically to examine persons in his care for preclinical evidences of disease, it is also incumbent on him to advise relative to the contents of the family medicine chest so that the home remedies used shall be in keeping with his views on the subject. The habit of many physicians of using tablet medication in cases of illness for symptoms as they arise tends to increase the scope of the family drug supply and in this way it often becomes quite extensive, even including narcotics.

Recollection of the shelf space in every pharmacy devoted to the display and storage of proprietary medicines a generation ago as compared with today would seem sufficient proof of a decrease in the use of these articles. While the advertisements of Dr. Munyon, Lydia Pinkham, Ayre's Sarsaparilla, St. Jacob's Oil, Carter's Little Liver Pills, Pink Pills for Pale People, and many more formerly made up over half of display publicity, this is by no means the case now, and tends to confirm the belief that there is a decreased demand for proprietary remedies. The American Medical Association deserves full credit for this lessened use of nostrums, by the frank publication of careful analysis not only of each preparation but also of the remedial claims made for it, and of the integrity of the maker. The Post Office Department also deserves much praise for the prompt and thorough enforcement of the so-called fraud order in

connection with the absurd claims made by the makers of useless proprietary articles. While this propaganda reaches the general public only indirectly through the medical profession, it is perhaps the best method for the general good.

It is true that much of the drug store space formerly occupied by patent medicines is now devoted to a large variety of beauty preparations. While their use can scarcely be termed self-medication, these products of creams, powders, eye-drops, lipsticks, hair dyes, cosmetics, perfumes, and so on do sometimes contain chemicals which make their use injurious or even dangerous to health. As long as salts of lead, mercury, and silver, benzol, wood alcohol, and similar poisons are used in the manufacture of some of them, it is the duty of the public health authorities to see that this violation of sanitary law is stopped.

The one evidence of general improvement in the public knowledge of health matters does not mean, however, that the danger of self-medication is past. On the contrary, we still have with us a smaller but even more pernicious group of secret remedies for which the owners claim curative value in dangerous diseases such as tuberculosis and cancer. The chief menace of these medicines or procedures lies in their employment at a time when these diseases could probably be cured by legitimate means, and only too often delays competent treatment until its value is doubtful or even useless. It is to this type of dangerous proprietary medicine that the American Medical Association is now directing particular attention at considerable cost, and it is the duty of the medical profession to see that these warnings are given suitable publicity for the general good. The public must be convinced that the argument against the use of a secret remedy is valid by proper analysis not only of the preparation but also of the claims made for it and of the

individual making them. It may even be necessary to undertake actual therapeutic tests, as the mere statement by a physician or group that a secret remedy is without value is now not generally sufficient.

Illegal Practice of Medicine. The practice of the healing art by persons not legally qualified to do so is very extensive, in fact the number of such persons tends to equal the number of legally qualified physicians. The methods employed by them are exceedingly varied and the amount of good or harm they do is as varied as the methods employed. No one can gainsay the fundamental danger of illegal practice in the nonrecognition of communicable disease and the delay in recognized appropriate treatment in diseases demanding immediate surgical intervention or prompt specific medication for the saving of life or minimizing loss of function. It is, however, an error to take the position that no benefit is possible from any treatment other than that by a regular physician and that such efforts should be absolutely condemned in every instance. This general condemnation without exception is at present the attitude of the average physician toward the question. This rigid attitude does not inspire the general public and it hinders rather than helps those whose duty it is to convince legislative committees of the danger of granting license to one or other obviously unworthy or unsafe school or cult.

Rank quackery employing emblems, tokens, potions, the laying on of hands etc. for the driving out of disease or evil spirits, to remove curses and the like, is still with us as shown in a long article which recently appeared in a Hungarian journal and reprinted in the London Illustrated News. These practices are still prevalent among certain groups in the United States.

Among the more dangerous illegal practitioners are those persons exploiting and using their own secret remedies and

promising cure chiefly of diabetes, tuberculosis, or cancer. Securing suitable legal evidence of this fraud is perhaps more difficult than would at first be apparent, but if obtained the fraud can usually be quickly brought to an end. Many of these charlatans practise under a diploma of one kind or another. These certificates of qualification are generally obtained from a socalled "diploma mill," and in a smaller number of instances are actual medical diplomas of deceased physicians. The stoppage of a fraud of this character is, however, usually of brief duration only as the individual soon comes out elsewhere under another name with the same remedy renamed or with a new remedy for the same or for another purpose. The almost weekly exposures of frauds of this kind in the Journal of the American Medical Association usually quote a record of the previous similar exploits by the same individual. When, however, an unscrupulous licensed physician undertakes a like fraud, his discovery is more difficult and the task of terminating his fraud is little short of impossible in many States. It really means that a revocation of license must be secured, and while the method for doing this has recently been vastly improved in the State of New York by the creation of the Grievance Committee under the new Medical Practice Act, it nevertheless remains a tedious and time-consuming task in most States, during which much harm can be done by the fraud in question.

The bulk of illegal practice is, however, conducted by groups of graduates from schools exploiting some special manner of treatment of disease. Long ago such treatment consisted chiefly in the administration of known or secret extracts of herbs and what not, but since the law has gradually restricted the use of drugs to legally qualified physicians, these schools have advocated the use of drugless procedures for the cure of disease.

It serves no purpose to detail a long list of such schools, most of which have flourished and died, or even of the current ones.

The statement deserves repetition, that the general public does not look with favor on the absolute condemnation by the medical profession of all forms of irregular practice in every instance. On occasions of legal survey or investigation, persons of social and intellectual standing often appear in defense of results obtained by illegal practitioners, which must be respected for what they are worth. On the other hand this does not mean that this very practitioner may not be a menace, not only to public health but also to his next patient, in the non-recognition of communicable disease or by delaying the prompt application of the proven specific remedy.

The stand by the licensed profession is undoubtedly sound, that the healing art demands for success suitable preliminary education and the ability to diagnose disease, so far as it is known, in the interest of the community as well as of the patient. A remedy to be rational must be based on the full knowledge of the condition to which it is applied. This attitude commands greater respect than does the mere statement that the legalized physician is the only person who can produce relief in sickness.

It would be going too far afield to detail the sins of commission and omission by irregular graduates with no preliminary education to speak of, after a course of study of one year and often much less, to say nothing of the at best insufficient and frequently inaccurate instruction. One concrete example will suffice. Diphtheria is today a practically completely understood disease. There remain no secrets in the etiology, symptoms, diagnosis, and treatment. In consequence its former frightful mortality has been made negligible, and with recently acquired additional knowl-

edge there is no reason why this disease should not disappear altogether. Among the scientists the world over there remains not a single dissenting opinion. In contrast you have the following, which is an unabridged copy:

TECHNIC AND PRACTICE OF CHIROPRACTIC

BY JOY M. LOBAN, D.C. PH.C.

President of the Universal Chiropractic College. Formerly Professor of Chiropractic Analysis at the Palmer School of Chiropractic.

Third Edition. Third Reprint.

Published by Loban Publishing Co., Pittsburgh, Pa. 1922.

"*Diphtheria.* Under adjustment the false membrane tends to exfoliate and to be coughed out entire within a few hours, with rapid recovery. In children, watch for possible strangulation from loosened membrane. Constant bedside attention is imperative until fever and membrane have disappeared. Convalescence, unless antitoxin has been used, is very rapid, and physicians watching the clinical course of diphtheria under adjustment customarily doubt the diagnosis unless culture is made. Antitoxin modifies the prognosis toward gravity, and in spite of adjustments persistent sequelæ often follow its use." (p. 416–417)

Also the following: "We have said that several bacilli are supposed to have power to cause disease in healthy bodies. Diphtheria is a disease caused by one of these. Yet Chiropractic adjustments have rapidly aborted diphtheria, apparently proving that the body has power to react strongly enough to conquer even this germ, providing the nerve channels be opened to allow of exertion of its full activity. It is probable that all diseases fall under the same law and that *no germ can find lodgment in healthy tissue.* Chiropractic affirms this as a truth and as yet no experience has tended to disprove it; the belief is strengthened by the years." (p. 273).

It is only necessary to point out the complete disregard of measures to protect public health, as well as the condemnation of the one remedy which has changed diphtheria from a scourge to a disease our grandchildren may never know.

It must be contended for public safety that the students of such schools must learn to recognize communicable disease if they are to be safe practitioners, and their license must be prevented until they are at least able to safeguard public health.

Another form of illegal practice has developed during the last decade or two, chiefly in large hospitals and clinical laboratories, namely the performance of acts definitely constituting the practice of medicine, by technicians without legal justification of any kind. In these recent years persons have been trained to administer anesthetics for surgical operation, to puncture veins for blood specimens or for therapeutic administrations, to do spinal puncture for like purpose, to make diagnosis from specimens, and similar acts all of which constitute the practice of medicine in the opinion of eminent legal counsel. The surgeon may say that such anesthesia is constantly under his supervision, when as a matter of fact he is usually absent at the beginning which is often the most hazardous part of the task. The laboratory director may say that a diagnosis is made under his supervision, when as a matter of fact he may be absent at the time of a critical decision. This does not mean that such technicians are generally not competent, on the contrary they are often very expert, in fact more so perhaps than a physician who has not specialized in the work. But it does mean that it is a bad example, as they are too often imitated by persons insufficiently trained, operating without any supervision, to the public danger. If this type of practice of medicine by technicians is to continue, it is

time that legal regulations should be made for them so that they may qualify in a way to exclude the incompetent and the unsupervised, and safeguard the public.

Religious Healing. The subject of religious healing must not be classed under the head of illegal practice, as every Medical Practice Act allows healing under the tenets of a church. No one questions the amount of good that comes to sick persons in this way, but relative to preventive medicine, possible delay in the prompt recognition of communicable disease and possible delay in urgent specific treatment to save life and function, must again be kept in mind.

Religious healing is of course often used as a cloak for ridiculous charlatanry and in such cases ranks with the worst kind of quackery. In honest religious healing two extremes are met with. On the one hand the devout man of God eager with every self sacrifice to minister to the sore and afflicted person in medical charge of a competent physician, and on the other hand the fanatic who believes either that there is no such thing as disease or in his own divine power to cast it out or have it cast out.

Were there only these two extremes to deal with, the problem would be a simple one, but as a matter of fact there are many examples of every gradation between the two.

The medical profession appreciates fully the value of religious ministration in disease to enhance patience, hopefulness, cheerfulness, tolerance, confidence, and what not, to say nothing of the actual and often permanent benefit derived from such aid in many cases of disturbed or diseased mental states. The fact remains, however, that such persons are in definite jeopardy unless proper medical supervision of their diseased states is associated with this religious healing which in the end may be the more important part of getting the individual well or making him more comfortable and contented if he cannot be made well.

Realizing the importance of the subject of Religious Healing, the Public Health Relations Committee of the N. Y. Academy of Medicine is having a study made of the subject under the able leadership of Dr. Frederick Peterson. A preliminary report of this Committee written by Alice E. Paulsen was published in the Journal of the American Medical Association in May 1926, to which the reader is referred for interesting details. The following information is copied from the Summary of that article: "There are a great variety of sects and cults and movements appealing to this popular tendency to associate health and religion, such as Christian Science, Jewish Science, Divine Science or Divine Healing New Thought, and Scientific Christianity. These are organized outside the church. In addition, there is considerable activity with regard to healing among Theosophists and Spiritualists. Moreover, the work has also been taken up in the orthodox churches, especially in the Episcopal church. The Nazarene movement makes its appeal through the Episcopal church. The Guild of Health confines its work to other Protestant churches. The novena, the application of relics and visits to shrines, such as Lourdes and St. Anne de Beaupré, are well established practices in the Roman Catholic church. Individual clergy and laymen are also engaged in the work."

"It is impossible to make any close estimate of the total number of adherents of this general movement, since some of the cults do not keep records of their membership. The number of Christian Scientists is estimated at 1,500,000. "Unity," a New Thought cult teaching "Scientific Christianity," is said to reach from three to five million people annually through its publications, lectures, and prayer services. The Nazarene movement now has about 7000 members. If the children and other dependents of adherents to these movements are counted, the number may reach

10,000,000. A wide appeal is also made through magazines and books. Some leaders make use of the radio to broadcast their teachings."

"The attitude toward the medical profession ranges all the way from hearty cooperation, as in the case of certain individual workers and in some church agencies, to frank hostility, as in the case of Christian Science."

Narcotic Drug Addition. Federal, state, and community investigations prior to and since the enactment of the Harrison Narcotic Law, similar state laws, and city sanitary ordinances, have directed public attention to this evil in a degree well beyond its importance.

This does not mean that the evil is a slight one, on the contrary, it is estimated that there are at least 20,000 drug addicts in the City of New York alone, but it does mean that even this large number scarcely justifies the hysteria voiced during recent years in the lay and professional press. The investigations just mentioned have demonstrated clearly and beyond doubt that drug addiction of today is almost exclusively an intentionally acquired habit, generally learned from another addict or taught by the vendor of these drugs who is generally also an addict. On account of the existing restrictive laws, the obtaining of pure narcotic drugs for other than medicinal purposes is difficult, and in consequence the addict usually secures "bootleg drugs" of uncertain composition at exorbitant price. For these reasons the relief from the evil is really a police problem rather than a medical one.

The medical profession gladly cooperates with the State in the observance of these laws in practice, but the result in restricting the use of narcotic drugs for illegal purposes is little better than the restriction in the use of beverage alcohol by the Volstead law.

A relatively very small number of physicians supply the addict illegally with narcotics under the guise of curing the

addiction, but this is so obviously a law violation that conviction is usually prompt.

Much has been written about drug addiction as a stimulus to criminal acts of particularly atrocious character, but closer investigation would seem to indicate simply that addiction is common in persons who perform such acts.

While there seems no question that an increasing deterioration of character and mentality occurs in drug addicts, it is also a well known fact that addiction is most common in persons of originally weak will power and peculiar sordid mentality.

In the effort to attract attention to the police problem as the outstanding material factor in the narcotic drug addiction question, there is no intenti n to belittle the importance of the relatively small number of cases of addiction occurring as the result of injudicious or prolonged administration of narcotic drugs to patients by physicians. Every humane person will realize the practical necessity of making so-called addicts out of a few people suffering from incurable painful disease such as inoperable cancerous growths in certain organs of the body. Aside from these, a proper appreciation of the danger of addiction in persons to whom narcotics are administered and particularly when such persons are of the weak minded and peculiar mental class from which addicts are generally recruited, will reduce the danger from this cause to the minimum.

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